I. Accomplishments of Water Conservation Program

The estimated total capital expenditure by the District through 1984 for structural water conservation facilities is on the order of $30 million. In 1984, approximately $700,000 was included in the District budget for nonstructural measures. The following sections presented discussions of accomplishments of specific water conservation measures.

1. Canal Lining

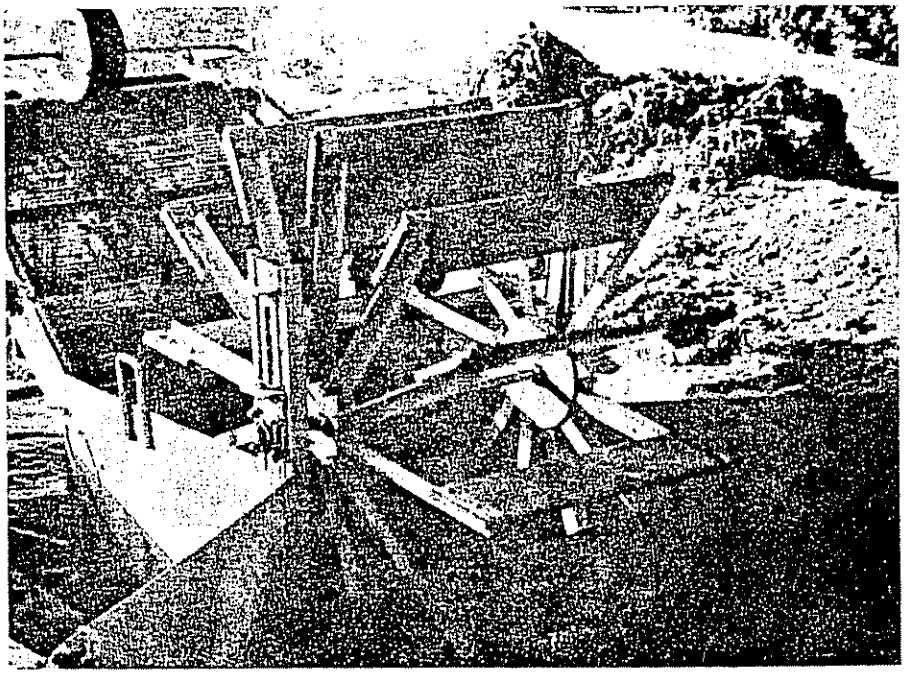
Since this measure was initiated in the early 1960's, approximately 871 miles of distribution system canals have been lined with concrete. Landowners have contributed nearly $5 million and the total District expenditure has been approximately $25 million.

2. Regulatory Reservoirs

The District has four regulating reservoirs in operation providing a total storage of 1,570 AF. Sites have been selected for two additional reservoirs which will have storage capacities of between 200 and 400 AF each. Approximately $3.3 million has been expended for construction of regulating reservoirs through 1984.

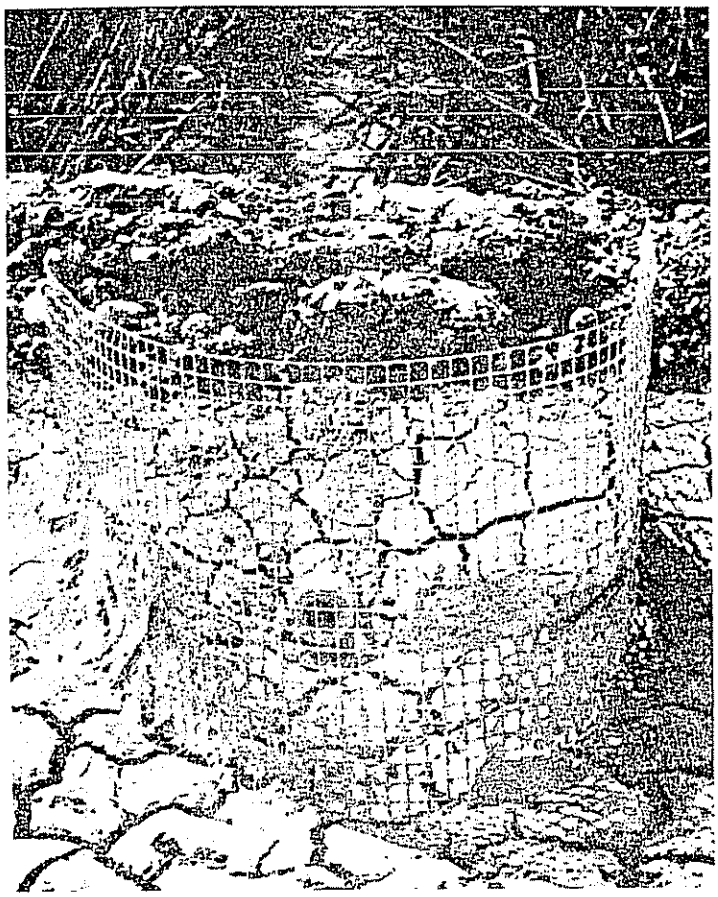
3. Seepage Recovery Lines

The District has constructed six miles (twelve 1/2-mile sections) of drainage lines parallel to the East Highline Canal to recover canal seepage losses. Total funds expended for seepage recovery lines has been $492,000, and approximately $50,000 per year is budgeted for



A HYDRAULIC MOSS REMOVER IN A FARM DITCH CONSERVES WATER BY REDUCING PLUGGING OF PIPES, WHICH IMPROVES DISTRIBUTION UNIFORMITY IN THE FIELD.

EXHIBIT IV.10



HARDWARE SCREEN BEING USED TO REMOVE MORE MOSS

EXHIBIT IV.11

operation, maintenance and power costs associated with the seepage recovery program.

4. Farm Delivery and Outlet Boxes

Since 1976, farm delivery structures have been installed or reconstructed using standard designs to provide for better water control and measurement of farm deliveries. Farm outlet structures have also been installed or reconstructed to facilitate measurement of excessive tailwater runoff which is the basis for penalty assessments.

5. Automatic Controls

The District has installed remote electronic monitoring and control devices at 22 locations including the All-American Canal and four regulating reservoirs. Over $1 million has been expended on these facilities.

6. Evaporation Ponds

Evaporation ponds have been constructed at 17 locations in the New and Alamo Rivers to reduce inflow to the Salton Sea. Through 1982, $1.5 million has been expended in this measure.

7. Irrigation Management Services Program

The Irrigation Management Services Program (IMS) was begun in 1981 as a two-year program sponsored by the USBR to provide information to farmers to increase irrigation efficiency and is being continued

through 1985. The annual budget for this program is approximately $170,000.

8. Improved Communications

All operational mobile equipment and vehicles have radio equipment for immediate exchange of information with supervision and Water Control. The District also has installed radio equipment in all the Division offices (where water orders are received and processed) as well as in the Operating Headquarters. Over $100,000 has been expended to improve communication capability in the District.

9. Educational Programs

Educational programs and training sessions for farmers and District personnel are imperative to the overall success of a water conservation program. Imperial Irrigation District, through the Water Conservation Supervisor has implemented an educational program for farmers participating in the IMS program. Monthly newsgrams, often containing conservation information, are mailed out with water and power bills.

10. Administration

Specific accomplishments under this section are difficult to define as they are integrated with overall management of the District. Such activities as water user penalties for tampering with gates or assessments for excessive tailwater runoff are clearly associated with the water conservation program but review of personnel require-

ments and duties would be undertaken as a part of prudent District management.

A "Modified Demand Irrigation Trial" was implemented on one zanjero run in August 1983 and includes about 11,000 acres.

It is still too early to have any significant data on the results of this program in terms of any water savings, or its possible effects on District operations.

11. Water Savings

The total impact of the water conservation program expressed either as total AF per year, or the accumulated water savings since 1976, has not been determined due to time constraints. However, there appears to be a downward trend in inflow to the Salton Sea, as well as water deliveries at Drop No. 1 on the All-American Canal, since the 13-Point Program was implemented in the mid-1970's. This is illustrated in Exhibit IV.12 entitled "Water Deliveries, Conveyance Losses, Precipitation and Flows to Salton Sea from Imperial Irrigation District, 1955-1982." Further evaluation is needed to estimate historic and projected future water savings from the existing water conservation program. In broad terms, the figure shows a trend of increasing diversion at Drop No. 1 and increasing inflow to Salton Sea for the 1965-1974 period.

The District's past water conservation programs have reducd losses, saved water, and reduced agricultural drainage into the Salton Sea. This latter measurement is the prime indicator which shows the

overall effectiveness of water conservation. Due to variations from year to year in cropping patterns, weather, economic conditions and other factors, it is necessary to compare Salton Sea inflow for a series of years to obtain a reasonable measure of reduced inflow.

With reference to Exhibit IV.12 "Derivation of Components of Inflow to Salton Sea," and comparing data in column headed "Imperial Irrigation District Inflow" for two 15-year periods shows the following:

15-Year Period	Average IID Inflow
1951 - 1965	1,040,000 AF
1966 - 1982	951,000 AF
Reduction in Inflow	89,000 AF

This reduction is directly the result of the District's water conservation programs during the past 15 years.

DERIVATION OF COMPONENTS OF
INFLOW TO SALTON SEA

(Values in 1000 Ac.Ft.)

	Imperial Valley Inflow					Coachella Inflow		
Year (1)	Measured and Estimated Inflow in New and Alamo River and Vicinity (2)	Less Inflow from Mexico (3)	Less Component from Coachella Canal (4)	Less Subsurface Inflow from West (5)	Imperial I.D. Inflow (6)	Coachella Valley Inflow (7)	Plus Coachella Canal (8)	Total (9)
1950	1,143	38		29	1,076	65		65
51	1,206	37		29	1,140	108		108
52	1,298	37		29	1,232	86		86
53	1,378	32		29	1,317	63		63
54	1,304	31	0	29	1,244	72	0	72
1955	1,119	49	5	29	1,036	85	5	90
56	1,170	78	10	29	1,053	71	10	81
57	1,084	73	15	29	967	53	15	68
58	1,080	106	20	29	925	56	20	76
59	1,145	124	25	29	967	57	25	82
1960	1,183	123	29	29	1,002	70	29	99
61	1,168	117	34	29	988	84	34	118
62	1,223	134	39	29	1,021	113	39	152
63	1,295	141	44	29	1,081	133	44	177
64	1,011	106	49	29	827	121	49	170
1965	996	113	54	29	800	137	54	191
66	1,110	105	54	29	922	131	54	185
67	1,126	98	54	29	945	129	54	183
68	1,108	107	54	29	918	136	54	190
69	1,068	105	54	29	880	142	54	196
1970	1,122	101	54	29	938	130	54	184
71	1,202	109	54	29	1,010	138	54	192
72	1,177	113	54	29	981	148	54	202
73	1,184	119	54	29	982	149	54	203
74	1,236	113	54	29	1,040	143	54	197
1975	1,229	101	54	29	1,045	159	54	213
76	1,289	104	54	29	1,002	161	54	215
77	1,130	109	54	29	938	147	54	201
78	1,096	100	54	29	913	137	54	191
79	1,203	146	54	29	974	141	54	195
1980	1,201	158	54	29	960	134	54	188
1981	1,121	158	54	29	880	150	54	204
1982	1,048	159	54	29	806	145	54	199

(1) Calendar Year.
(2) Measured flow in New and Alamo Rivers at Salton Sea plus inflow from drains flowing directly into Sea.
(3) Measured surface flow of New and Alamo Rivers at International Boundary.
(4) Portion of seepage from Coachella Canal estimated to enter Salton Sea via Imperial Valley.
(5) Subsurface flow entering Imperial I.D. from west which is intercepted by drainage system.
(6) Column (2) less (3), (4) and (5).
(7) Coachella inflow as reported by USGS through 1972. From 1973 amount taken from Lowell Weeks' declaration of August 31, 1983 (Exhibit 11) and is "drainage water discharge from Coachella Valley."
(8) Same as Column (4).
(9) Sum of Columns (7) and (8).

Exhibit IV.12

12. Summary

The Imperial Irrigation District has demonstrated, through actions and policies of its Board of Directors, an awareness of the need for efficient water use within the District and the need to reduce inflow to the Salton Sea from the District. Water conservation measures, both structural and nonstructural, have been implemented and have been effective to varying degrees.

Additonal water conservation measures have been suggested by the Department of Water Resources and the U.S. Bureau of Reclamation. These measures are the subject of on-going studies and when completed, will provide a basis for expanding current water conservation practices. The Board has, and will continue, to assure that available water supplies to the District will be utilized in a reasonable and beneficial manner.

TABLE IV.4

Comparison of Water Supply, Irrigated Area
and Inflow to Salton Sea from
Imperial Irrigation District (a)

Year (Last Year of 5 Years)	Water Received at Drop No. 1 1,000 AF	Inflow to Salton Sea 1,000 AF	Irrigated Area 1,000 AF	Amount of Water Received at Drop No. 1 Per Irrigated Acre	Inflow to Salton Sea Per Irrigated Acre
1964	2,931	984	432.3	6.8	2.3
1965	2,859	943	431.9	6.6	2.2
1966	2,831	930	432.3	6.5	2.2
1967	2,785	915	435.5	6.4	2.1
1968	2,748	882	437.6	6.3	2.0
1969	2,729	893	439.6	6.2	2.0
1970	2,755	921	440.6	6.3	2.1
1971	2,768	938	441.5	6.3	2.1
1972	2,794	945	441.3	6.3	2.1
1973	2,824	958	442.0	6.4	2.2
1974	2,903	990	443.8	6.5	2.2
1975	2,952	1,012	447.6	6.6	2.3
1976	2,932	1,010	450.9	6.5	2.2
1977	2,901	1,001	454.0	6.4	2.2
1978	2,844	988	455.5	6.2	2.2
1979	2,791	974	457.4	6.1	2.1
1980	2,744	957	458.2	6.0	2.1
1981	2,741	933	459.3	6.0	2.0
1982	2,706	907	460.4	5.9	2.0
1983	2,655	881	459.2	5.8	1.9

(a) Amounts based on five year average

CHAPTER V

OTHER PROGRAMS FOR FUTURE CONSIDERATION

A. INTRODUCTION

Included within this chapter are programs which may be considered in the future when formulating water conservation plans. Some of these are partially incorporated within existing conservation programs; others are included within the 1985 Plan presented in Chapter VI. Other programs may appear meritorious after more extensive monitoring and evaluation and, therefore, were included. The District is open-minded to all suggestions.

B. STRUCTURAL PROGRAMS

1. Improvement of Measurement Structures

Begin making changes to the existing weir/orifice measuring structures to improve their accuracy.

2. Pipelining

Conveying water in pipelines is a costly but effective method to eliminate seepage and evaporation, but some water would be lost through leakage at joints.

3. Desalinization

Desalinization of Colorado River water, or reduction of induced salts upstream of delivery to the District system would eventually reduce the need for water to leach out the excessive salts, since reclaimed land would thenceforth be irrigated with nonsaline water.

C. OPERATIONAL PROGRAMS

1. Standard Delivery Head Increments

Standardizing delivery head increments allows "matching" of orders to reduce spill.

2. Sequential Water Deliveries

Sequential water deliveries allow timely movement of water deliveries.

D. ADMINISTRATIVE

1. Water Allotment

The District has never been required to allocate or limit water deliveries. In fact, within system capacities, the District attempts to deliver to each water user the amount of water ordered.

Allocation of water is widely practiced in California an the irrigated West. This is frequently the case where project water is a supplemental supply to groundwater. It is also necessary where the project supply is barely adequate to meet minimum water requirements.

Water can be allocated in several ways, including but not limited to:

a. Delivery alloation - for example, 1 cfs/20 acres, or other acreage amount;

b. Annual uniform limitation, for example, 5 AF/Ac., perhaps allowing transfers between water users;

c. Crop allocation - for example, consumptive use plus leaching requirement divided by 70 percent efficiency;

d. Allocation based on assessed value, land only.

2. Water Rates

The District's current water rate schedules are given in the Appendix.

It is frequently suggested that water rates should be increased substantially to encourage conservation. However, others, including members of the Water Conservation Advisory Board, suggest that those that have excessive tailwater runoff or use excessive amounts of water be charged.

These suggestions would lead to either or both tailwater charges, such as the current tailwater assessment, or escalating water tolls such as those in Water Rate Schedule No. 1A.

The foundation was laid in the 13-Point Program to prepare for possible escalating rates for annual water use, by Item 10 therein, which provided for "The initiation of record to reflect accrued water use per acre per parcel through computerized billing process for period July 1 to June 30 for each year."

The District's water rates have been set, and revised periodically, on the basis of providing only the necessary funds to meet budgeted expenditures, primarily operation and maintenance of the water systems. However, in 1976, and subsequently, the rates have been increased to provide funds for the District's comprehensive water conservation programs, the current amount being $1.75/AF.

It is expected that periodic consideration will be given to implementing certain rate structures to further encourage water conservation, especially if other programs are not effective.

3. Incentives

Proposals have been presented from time to time for the Dictrict to offer reduced rates as incentives to encourage such on-farm conservation measures as installation of tailwater recover systems or reser-

voirs. Another suggestion has been that reduced rates be offered to water users whose irrigation management practices do not permit excessive tailwater runoff. These propoals should be studied periodically and brought forth for consideration by the Board.

Several types of incentives could be established based on volumetric measurements of tailwater such as:

a. Deferral of per-acre water conservation assessment;

b. Cash awards;

c. Credit on future bills;

d. Recognition in the form of award dinners, Irrigator of the Year, publicity, etc.

4. Conservation Plan for Nonagricultural Use

Coordinate with local agencies and users to develop water conservation plan for municipal, industrial, and recreation/wildlife uses.

E. ON-FARM

1. Crop Restrictions

A conservation tool, often suggested, is to reduce demand by growing of crops having low water requirements. This should not be necessary in Imperial Valley in the foreseeable future and is not an acceptable measure for the District to consider.

2. Retricting Tail Water Runoff

Many suggestions have been made in the past to restrict the rate of tailwater runoff by physical means such as smaller pipes. The current maximum size of outlet pipe in tailwater structures or any inlet to District drains is 12-inch diameter. Proposals that this be restricted by inserting an 8-inch diameter "choker" pipe, or similar devices, have been made.

To date, these suggestions have not been implemented primarily because such restrictions would cause trash to plug up the pipe more readily. It seems more practical to reduce the quantity of tailwater by improved irrigation management, or other alternative such as tailwater recovery.

3. Reduce Excessive Leaching

Develop programs to control leaching on sandy soils.

F. PROGRAMS SUGGESTED BY OTHERS

1. USBR Proposals

In its Draft Special Report, dated September 1983, the USBR concludes that "cost-effective water conservation opportunities are available to the District." Exhibit V.1 is taken from Table 24 of the USBR report, which shows the features they propose be considered. The USBR proposes that "a natural progression for consideration of further detailed study leading to authorization and funding of the water conservation program implementation would concentrate initially on these features producing the most predictable results" (underscoring added).

The USBR initiated an additional study in October entitled "Imperial Irrigation District Canal Lining and System Improvement," (CLSI) investigation, in which the District has agreed to participate.

The first purpose of the CLSI investigation is "to further study the application of water conservation measures...," and the initial effort will be to acquire additional water flow data.

Several administrative programs are suggested:

a. Distribution based on total demand (sequential irrigation);

b. Enhanced water accounting/automatic data processing;

c. Sliding water rates/incentive rebates.

COMPARISON OF WATER CONSERVATION FEATURES
Water Conservation Opportunities
Imperial Irrigation District

Feature	Capital Cost ($Million)	Potential Water Conservation (Acre-Feet)	Further Study Period (Years)	Potential Implementation Period (Years)	Responsible Agency	Relative Degree of certainty of results
1. Structural features unaffected by operational changes:						
Canal Lining (350 mi.)	80	100,000	2-5	5-10	Fed/Partner	80-90%
System Automation-East Highline Canal only	8.5	25,000	3-5	5-10	Fed/Partner	75-85%
On-farm water measuring devices	4.5	-	1-5	5-10	Fed/Partner	50%
Sub total	93.0	125,000				
2. Structural features possibly affected by operational changes:						
Large Regulating reservoir	24.4	20,000	4-5	5-15	Fed/Partner	Int. 80% Long term 30%
Spill Interceptor System (inc right-of-way cost incl.)	13	70,000	4-5	5-15	Fed/Partner	Int. 80% Long term 30%
Sub total	37.4	90,000				
3. Distribution system management programs:						
Computerized System Scheduling 1/	.3	___	2-5	5-20	District/Fed	75%
Administrative Programs 2/	-	-	5	5-20	District/Irrigator	50%
Sub total	.3					
4. On-farm management programs:						
Field Scheduling 3/	.5	135,000	5+	20+	Irrigators/District	25-50%
Administrative Information and Incentive Programs 4/	-	-	5+	20+	District/Irrigators	50%
Sub total	.5	135,000				
Total 5/	130.9	350,000				

1/ Results are uncertain but could possibly reduce the need or effective life of the large regulating reservoir and/or spill interceptor system. Impacts should be determined by a demonstration program. Full implementation and use could require 10 to 15 years.

2/ Includes total demand or "sequential" operation with irrigators receiving water for shorter periods than 24 hours. Delivery would be received when water is available rather than at a normal turn or time. Would require substantial demonstrations, information, and change in current practice.

3/ Results are uncertain because success requires full implementation and use by water users. 50% implementation could require 5 to 20 years. The annual cost of providing this service to 450,000 acres is about $2.5 million.

4/ These options are designed to promote water use awareness and on-farm water conservation. They include enhanced water accounting and a sliding-scale water rate or a rebate program. Opportunities would be evaluated by a 3 to 5 year demonstration program (possibly included with a system scheduling demonstration).

5/ Computerized system scheduling costs and technical staff costs are not included which would amount to $500,000 annually for 450,000 acres.

Exhibit V.1

Exhibit V.2, taken from the Bureau's Figure 13, is the proposed implementation schedule. This schedule indicates that construction would take place beginning in 1990 with the interim period dedicated to additional studies.

2. Department of Water Resources

In its report dated December 1981, entitled "Investigation under California Water Code Section 275 Use of Water by Imperial Irrigation District," the California Department of Water Resources (DWR) suggested therein three priorities of improvements:

a. Nonstructural

1) More flexible deliveries;
2) Improve on-farm irrigation techniques;
3) Expand use of irrigation management scheduling.

b. Structural

1) Line canals/laterals;
2) Expand seepage recovery system;
3) Construct more regulating reservoirs;
4) Expand electronic monitoring controls;
5) Expand use of tailwater recovery systems.

c. Line All-American Canal.

The Department of Water Resources made an attempt to estimate the annual amount of water which some of these improvements would save, based on District records, not on any extensive field investigation. In Table 15 of the DWR report, DWR estimates water savings from

WATER CONSERVATION IMPLEMENTATION SCHEDULE
WATER CONSERVATION OPPORTUNITIES
IMPERIAL IRRIGATION DISTRICT

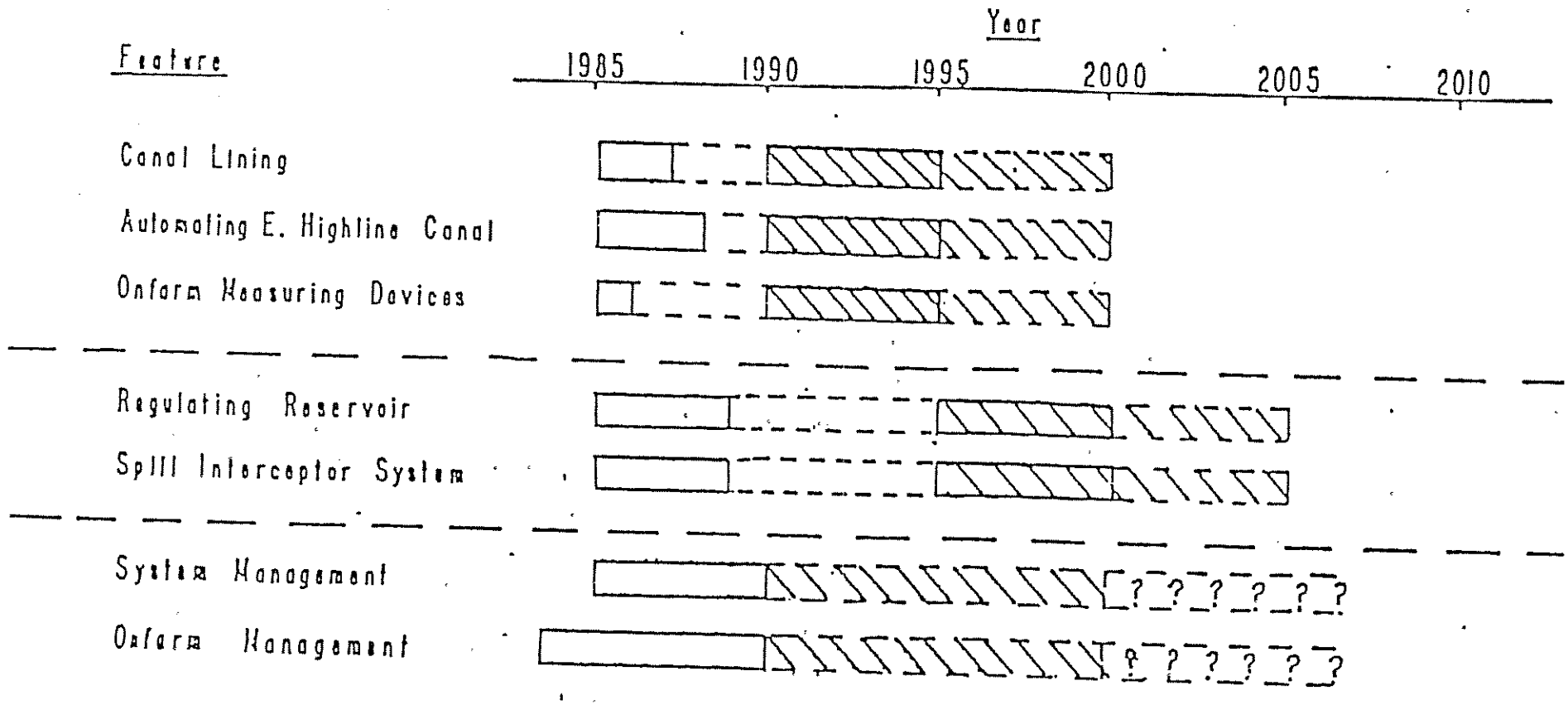


Exhibit # 2

lining the All-American Canal, lining District canals and laterals, and expanding the seepage recovery program. However, for all the remaining improvements identified, DWR estimates that "A combination of these programs...could save 228,000 AF, including 178,000 AF of leaching water and tailwater and 50,000 AF of canal spills." The DWR suggests in the same Table 15 that "an operations plan is required to determine the most effective and economical level of development for each program (which) should complement the others, not duplicate."

3. Citizens' Salton Sea Committee: June 1, 1976

Early in 1976 a group calling itself the "Citizens' Salton Sea Committee" approached the District Board asking for its cooperation in finding solutions to the rising elevation of the Salton Sea. District directors and staff met with this group for several meetings mainly to provide data. On June 1, 1976, a subcommittee of this group presented written recommendations to the Board, a copy of which is included in the Appendix. Summarized below are some of the major recommendations from this subcommittee:

Joint Assessment and Recommendations - Short Range (July 1976 - June 1979)

a. Initiate an immediate program of water use, and control the flow of drainage to the Sea:

   1) Begin spreading water on District lands, Fish and Wildlife lands, and volunteer private lands using drainage water at no charge;

   2) Reduce delivery (to District) at Drop No. 1 by five percent below 1975 usage;

3) Study intercept or lateral to be placed along east side of Alamo River; pond and reuse in Vail system;

4) Initiate a program to educate water users; step up efforts to patrol wastewater offenders;

5) Accelerate current program of management ponds.

b. Establish an incentive conservation water-use program:

1) Increase water rate for five AF/Ac. per year or less by 50 cents to one dollar for lands using drainage pipes larger than eight-inch diameter or outflow greater than 1.2 cfs with a six-inch head. Apply sliding scales beyond five AF/Ac.; add $1/AF for each step (5-8, 8-12, 12-16, 16-20, 20-24 AF/Ac)

2) All funds collected above $3.50/AF should be earmarked for system improvements which can reduce waste and improve delivery techniques.

c. Allow any water user to apply to improve outlet:

1) Install standard and certified structure with an eight-inch diameter drain pipe six inches below field grade at landowner's expense.

d. Long-Range Recommendations:

1) Contact State of California Water Resources Control Board and Border States Commission seeking assistance in planning and implementation of conservation plan.

2) Establish long-range planning board, including representatives of political subdivisions (including Mexico) to coordinate all planning regarding Salton Sea and Colorado River delta.

3) Engage a technical investigator.

4. Suggestions from Individuals

In 1974, a prominent Valley farmer submitted written suggestions for consideration by District Water Department staff relating to water conservation, primarily tailwater runoff. This farmer's suggestions are summarized below:

a. Surface runoff charges -

When tailwater exeeds ten percent of delivery:

Triple charge for amount over ten percent.

Exception 1: Limit to five percent for no crop.
Exception 2: For runs longer than one day, charge for excess only for the day water is wasted.

b. Measurements -

Three measurements, seven hours or more apart, used to determine amount of runoff...measurement OK after delivery stopped.

c. Notices -

Immediate notice to water user upon determination of excessive runoff.

d. Adjusting Deliveries -

If requested to do so, District should make reasonable effort to adjust delivery.

e. Reducing or withholding orders -

District should reduce orders only where very high percentage of delivery can be prevented from going into Salton Sea. Notify water user and irrigator immediately.

f. Explain foregoing program to all water users; try the program for six months, including information on runoff measurements.

CHAPTER VI

WATER CONSERVATION PLAN

A. INTRODUCTION

This Chapter brings together on-going water conservation programs and identifies additional efforts that will further enhance the District's and its water users' effective use of Imperial Valley's valuable water supply.

The District finds that a comprehensive water management plan to guide future water supply, distribution, use and disposal will be necessary to ensure adequate water supplies and effective use. Such a plan is required to focus on water management activities, establish priorities, and to allocate monetary and water resources available to the District.

The Plan consists of:

1. Measurement and analysis of water supply, distribution use and disposal to define current quantities and to serve as a basis for defining priority actions and to assess the effectiveness of actions taken;

2. A comprehensive plan framework to provide a vehicle for specific activities;

3. Potential actions which may be useful for effective water management;

4. Evaluation and Pilot Programs to assess the effectiveness of potential actions;

5. Major emphasis being placed on cooperation, coordination, and education.

The District water operations staff is composed of technicians, professionals and managers experienced in operating and maintaining the District's vast irrigation and drainage system. Their major responsibility is to deliver water to water users in the amount ordered at the time required, and at the lowest possible cost.

The water users are experienced in applying water to crops, in the proper quantity, at the right time, and uniformly so as to produce crops which will yield a maximum profit.

There is strong need for integration and understanding of District and water user operational capabilities, limitations and needed adjustments of both activities to further maximize water delivery and use effectiveness.

The short-term program:

1. Develops criteria for a water measurement program needed to assess deliveries, spill, tailwater, consumptive use and leaching quantities, and establishes a planning function to develop planning policies and long-range plans;

2. Defines the current water conservation program underway and budgeted, including costs.

Before long-term programs can be implemented, detailed analyses of data gathered during the short-term will be required. However, several long-term goals which can be identified are: virtually all laterals and most main canals will be concrete lined; all major structures will be remotely controlled; and a computerized control system will be in full operation performing the major monitoring, controlling, measuring, and record-keeping functions of District water operations. The District will continue to coordinate and cooperate with water users to achieve the highest practicable overall efficiency in water use in Imperial Valley.

The Plan must be subject to change as conditions mandate. It should serve as a flexible framework in which to guide and coordinate activities.

It is a general plan, and will need to be reviewed annually to analyze its effectiveness. During these reviews, the proposals offered by various individuals and groups, described in Chapter V, should be re-examined and considered for possible implementation. This would apply especially to such proposals as water charges or incentives, which should be considered if other programs are not being as effective as anticipated.

B. NEED FOR ACCURATE MEASUREMENTS

Clearly, knowledge of water received by the District, and its distribution, delivery, use and disposal is basic to the operation of the District.

Accuracies of present water-flow measurements, while acceptable for overall distribution of water, and even for billing purposes, are not necessarily sufficient to determine specific types of losses. Seepage losses, although apparently significant in annual quantities, based on District records, are not a large percentage of the total water inflow, and are known to vary from place to place, and time to time. If flow measurements are accurate only within ten percent, plus or minus, and percentage seepage losses are less, such losses cannot be determined with reliability.

The purpose of the water measurement program is to:

1. Define more closely how water is used and disposed of within the District;

2. Provide information to establish water use and conservation criteria;

3. Measure conservation accomplishments.

For each element of the internal District water balance there are wide-ranging differences in measurement requirements, precision and accuracy attainable, reliability, applicable methods, procedures, manpower needs, processing techniques and costs. Because of the large amount of water delivered, the number of farms, miles of canals and complexity of the distribution and drainage system, any method or procedure to measure, compile, process, evaluate and report necessarily involves a significant expenditure of management effort, funds and manpower. Compilation of the data required could range from minor expansion of the present

program through some additional measurement and estimation and some reevaluation of this data, to detailed measurements of all or nearly all of the water quantities involved.

The USBR/IID cooperative study during the next two or three years will emphasize the accurate measurements of water flows, which will require the installation of additional measuring devices and recorders.

C. WATER MEASUREMENT AND ACCOUNTING PROGRAM

The water accounting measurement program has two principal objectives at this time. The first and foremost is to make those measurements necessary for the delivery of water. These are termed operational measurements. A secondary objective is to obtain those measurements helpful and necessary in determining the disposition of water within the Imperial Irrigation District. Over the years the measurements required for operational purposes have been taken and recorded.

Measurements made by the District include:

All-American Canal flows
Deliveries from All-American Canal to Main Canals
Lateral Canal Headings
Farm deliveries
Spills (sample)
New and Alamo River flows at Mexico, and at discharge to Salton Sea
Drainage ditches discharging into Salton Sea
Drainage sump discharge
Other measurements as required

The supplemental measurements necessary in preparing a water balance have not been made in any significant number until recently. The principal objective of the Imperial Irrigation District is to deliver water for farm use, which it does effectively. Information for water balance, however, requires additional measurements including a more accurate definition of tailwater runoff, canal spills, and generally those things which involve the disposal of water.

The District has historically made numerous measurements of flows required for operational purposes. Within the last several years, this policy has changed and measurements are currently being made of canal spills, some lateral headings, some field deliveries and tailwater structures.

Over the years accurate measurements have been made of the amount of water which is flowing into the Salton Sea from the District. This flow includes tailwater runoff, leaching water, canal spills, rainfall, subsurface inflow and surface inflow from outside the District, sewage, etc. The problem in preparing a water balance is that there is some difficulty in separating the total inflow into the sea into all of its various components.

The District has a goal to use water as effectively and efficiently as practicable. To reach this goal it is recognized that an accurate accounting of the water is necessary. With this information, it is possible to define and evaluate means of conserving water. Accurate measurements will allow for the continuing efforts by the District to effectively manage the distribution of water.

Any water accounting procedure must be reasonable, practical and cost effective. The programs are being funded by the District and its farmers, and there are limited resources. It must be recognized that

measurements being requested are in a gravity system being exposed to all of the elements of weather, vegetation, algae, etc.

In considering the water accounting program, the extremely large number of facilities must be considered, as previously described in Chapter III.

There are about 1,800 service pipes within the District. These service pipes provide water for domestic uses, stock watering, small irrigations and other miscellaneous uses, and range in diameter from two to six inches. These service pipes provide a very small amount of water when considering the whole, and metering would not be practical.

Therefore, water delivered through service pipes has been and will continue to be estimated. A better estimate of the quantity could be made with a survey procedure using random samplings.

Many of the features noted above are measured directly and some are equipped with recorder chart equipment. Most of the measuring locations are on facilities where flow is relatively constant over a 24-hour period, and the flow volume is determined based on the observed flow, assumed constant over a 24-hour period.

The entire distribution system is extremely complex and there are a number of variables. As an example, not all lateral canals have spills to drains. Some of the lateral spills flow into adjacent canals and the water becomes available for reuse.

The system is an open-canal system without a significant amount of storage, but water must be ordered and scheduled before it is delivered. Changing weather such as high winds, rainstorms, etc., can affect the delivery pattern.

The District has an obligation to provide water to farmers and others as required. Although the demands on the system are not under the control of the District, it must ensure there is sufficient water to meet the needs, and this water must be delivered when and where it is needed.

Metering and measuring in a gravity system are considerably more complex than in a pressure system. Propeller-type meters are not usable in most instances because of algae and debris in the water. The District is evaluating recently developed electronic equipment which uses computer technology to totalize flow data.

1. Measurement and Accounting Principles

In developing a water accounting program, the significance of the quantities must be carefully considered. As an example, the USGS rates a gauging station with an accuracy of 95 percent as an "excellent" record. Assuming the gauging station at AAC Drop No. 1 is measured with an accuracy of 95 percent, there could be a deviation of plus or minus 125,000 AF. This is a very large quantity of water, and any measuring program must consider the accuracy obtainable under reasonable means. It must be borne in mind that more detailed measuring of major quantities of water does not result in itself in water conservation.

A major item in the accounting procedure is processing. Data must be obtained, reduced and compiled. Reduction of graphical data from stream-flow recorders requires a significant amount of time. The District is currently taking steps and utilizing computers to aid in data reduction and compilation. It is also

investigating the use of computer information to obtain streamflow measurements directly. The responsibility for processing the information must be borne by those who are knowledgeable about the needs and purposes for which the data will be used.

Any data collection program requires an evaluation of the data and proper summaries which are usable to evaluate the overall program.

It is necessary that those involved in data collection be directed, at least in principle, by those utilizing the data; otherwise, unnecessary and useless data will be collected at excessive costs.

D. FUTURE WATER REQUIREMENTS

Past and current water requirements for Imperial Valley have been met by diversions from the Colorado River and delivered by the District to water users. Before Hoover Dam was built, diversions were sometimes limited to the available supply in the River near Yuma, Arizona. Since completion of Hoover, the District seldom has been limited in diversions, and the quantity diverted was considered to be equal to the water requirement of the Valley, including operational losses within the conveyance and agricultural systems. The conservation measures should reduce these losses, thereby resulting in a lower water requirement.

Historic records are normally analyzed to estimate or forecast future water requirements. Subsequently, estimates are made of the reduction in losses which will result from water conservation programs.

However, it is important to consider whether the District has reached a peak in water use. Annual use of water has varied considerably over the years due to changing cropping patterns, climatic conditions and other factors. During the ten year period from 1974 through 1983, the annual inflow at Drop No. 1 ranged from 3,072,000 AF in 1974 to 2,417,000 AF in 1983, a variation of 655,000 AF or 27 percent.

As described earlier, the District has regularly computed consumptive use for the actual acreage of crops for each year, using acceptable unit values of use. By adding leaching requirements, other uses and losses, the annual requirement is determined.

The USBR, in its 1983 Draft Report, discusses the apparent discrepancy between computed requirements and actual historic diversions, and concludes as follows:

> "These results indicate that traditional methods such as Blaney-Criddle are adequate for estimating consumptive use for sizing a distribution system. However, such methods appear to over estimate irrigation requirements by about 5 percent because the water contributed by the regional groundwater system is not considered. The net result is that estimates of project irrigation efficiency may be too high. Direct measurement of consumptive use with a neutron probe is more accurate and precise in determining actual irrigation efficiencies. Therefore, the downward adjustment in the consumptive use value used in the water budget estimated for the District is justified."

District staff do not necessarily agree with this conclusion. Use of the neutron probe to determine consumptive use may not be applicable to Imperial Valley due to the high water table.

The conclusion herein is that a comprehensive study by highly qualified people is necessary to make a reasonable and reliable forecast of future water requirements in Imperial Valley, taking into account the basic advantages over other agricultural areas including soils, climate, reliable and low-cost water supply, and open gravity system.

It should be recognized that, with the wide variety of crops which have been and can be grown in Imperial Valley, acreage of most crops varies from year to year due to many reasons. In the future, increased double cropping and transplanting may increase total water requirements. Another consideration is that increasing water costs in other areas of the southwest may result in acreage of certain crops shifting to Imperial Valley, and this shift on water requirements must be considered.

The need for water to cool geothermal power plants being constructed in the Valley has been described earlier. Developers of these plants have expressed the desire to acquire water allocations of salvaged water through contributory funding of conservation projects.

A study should be initiated, perhaps by a cooperative agreement with the University of California, to forecast future water requirements for Imperial Valley.

E. POTENTIAL SAVINGS BY WATER CONSERVATION PROGRAMS

The Bureau and DWR, in their respective studies, have made estimates of the total annual amount of water which might be saved by water conservation projects. These estimates are not supported by detailed technical analyses, but are based upon review of existing records furnished by the District.

Furthermore, estimating the breakdown of losses required these investigators to make numerous assumptions such as percentage of a particular loss which might be salvaged by water conservation programs or projects.

The Bureau, in its 1983 Draft Report, identified "Potential Water Conservation," in the total annual amount of 350,000 AF, if all water conservation "opportunities" were implemented.

The DWR in its December 1981 report estimated (Table 13 therein) that 438,000 AF/year "could be saved" from the quantities of "water being lost."

The engineering firm of Bookman-Edmonston Engineering, Inc., (B-E) a consultant to the District in preparing this Plan and in certain litigation matters, has prepared independent analyses of losses and potential water savings. Because of the time constraints imposed by IID, and the complexity of the factual data and issues involved, B-E's reports are reconnaissance level in scope. The conclusions expressed by B-E are considered sound, but are subject to revision as more detailed information and more complete analysis become available.

Bookman-Edmonston concluded in its study that, based on a water balance for the years 1977-1980, the following quantities of water were identified from the system each year:

Item	Loss (1,000 AF)
Conveyance Losses:	
Net Canal Seepage and Evaporation	263
Operational Spills	136
Tailwater	327
Leaching	236
Total	937

Some of the losses would not be recoverable. These include:

1. Canal losses from evaporation;
2. Leaching water required to maintain suitable conditions for growing crops;
3. Some tailwater;
4. Losses which under any conservation system would still occur, such as canal seepage and operational carriage water.

The unique conditions within the District which control irrigation (including climate, distribution, irrigation and drainage systems, water quality and soils), dictate that some water could not be recovered or conserved. Potential conservation amount estimates are shown in the following tabulation:

Item	Loss (1,000 AF)
Conveyance Losses:	
Canal Seepage	100
Operational Spills	100
Tailwater	125
Deep Percolation	0
Total	325

F. FINANCING WATER CONSERVATION

Past funding of projects related to water conservation has been accomplished using a portion of the revenues from water sales as described earlier.

It is anticipated that future water conservation projects and programs be funded in the same manner. However, during recent months, proposals that water conservation projects be paid for by "others" have been made. This

idea is believed to stem from the Bureau's study and draft report of Water Conservation Opportunities, in which estimates are made of water losses which might be salvaged within Imperial Irrigation District. Furthermore, assuming that the District now delivers the full agricultural water requirement to farmers, it appears that such salvaged water could be available for use by other California entities, who might be willing to finance conservation projects in exchange for use of the salvaged water.

By Resolution No. 8-84, adopted January 24, 1984 (see Exhibit VI.1), the District invited "other members of the Seven Party Agreement, the Bureau of Reclamation and beneficial users, including geothermal industry, within the District...to discuss water conservation opportunities..... including the cost and method of payment for such conservation, and the potential use by the District and other members of the Seven Party Agreement of the water thus conserved."

It is unknown at this time if or when agreements might be made which would provide moneys to the District from any of these other parties.

Discussions have taken place, but no firm agreement appears imminent, because the two main components of any agreement - water quantities to be salvaged and cost of specific water conservation works to salvage the water - have not been determined. Studies to delineate these components will be necessary.

The Bureau's new study "Imperial Irrigation District Canal Lining and System Improvement" (CLSI) USBR Draft Plan of Study, July 1984, has the purpose to "further study the application of water conservation measures to existing Imperial Irrigation District irrigation facilities, operations, and practices in promoting more efficient use of water, and to develop an additional water supply for future needs in the District and in Southern California."

RESOLUTION NO. 8-84

WHEREAS, the Imperial Irrigation District is responsible for delivering Colorado River water to certain lands within Imperial County for agricultural, domestic and industrial uses; and

WHEREAS, the District has rights to certain portions of the waters of the Colorado River, such rights having been perfected at the beginning of this Century and having been recognized by Congress, the Supreme Courts of the United States and the State of California, and other individuals and entities; and

WHEREAS, the District, formed under the laws of the State of California, operates and maintains a vast system of water control, conveyance and distribution facilities, and an extensive drainage network; and

WHEREAS, it is the policy of the United States and the State of California that the general welfare requires that water resources be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented; and

WHEREAS, it is also the policy of the United States and the State of California that full utilization of water resources requires that a maximum effort must be directed toward maintaining the highest possible water quality; and

WHEREAS, the District believes that the members of the Seven Party Agreement should use their best efforts to see that all Colorado River water to which they are entitled be put to beneficial use to the fullest extent possible and that all appropriate measures are implemented to maintain salinity concentration at or below levels presently found in the lower Colorado River; and

WHEREAS, the Board of Directors of the District, in recognition of federal and state policy of water conservation,

has previously adopted structural and non-structural water conservation programs; and

WHEREAS, the District recognizes that additional conservation measures might make more water available for beneficial use within the District or be available to lower priority users according to the Supreme Court ruling in Arizona v. California and the provisions of the Seven Party Agreement.

NOW, THEREFORE, BE IT RESOLVED AS FOLLOWS:

1. The Imperial Irrigation District shall expand its water conservation programs including, but not limited to, increased water conservation educational programs for valley farmers, increased emphasis on canal lining, water regulation reservoirs, and other structural improvements with the goal of reducing inflow to the Salton Sea 100,000 acre feet by July 1, 1985.

2. That the Bureau of Reclamation continue with its evaluation of water conservation opportunities in the District in order to determine the amount of water which could be salvaged and the cost-benefit of the conservation methods recommended.

3. The District is willing, and invites the other members of the Seven Party Agreement, the Bureau of Reclamation and beneficial users, including geothermal industry, within the District, to meet with officials of the Imperial Irrigation District to discuss water conservation opportunities in Imperial Valley, including the cost and method of payment for such conservation, and the potential use by the District and other members of the Seven Party Agreement of the water thus conserved.

PASSED AND ADOPTED this 24th day of January, 1984.

Copies:
President
Twogood
Shreves
Legal
Wilson
General Files

IMPERIAL IRRIGATION DISTRICT ORGANIZED JULY 25, 1911 EL CENTRO, CALIFORNIA

IMPERIAL IRRIGATION DISTRICT

By _____
President

By _____
Secretary

Other means of financing, such as loans or bond sales, may be considered at some future time, as will increased rates or assessments if deemed necessary.

The Bureau's Draft Special Report dated September 1983 contained an estimate that the capital cost of "cost effective" programs would be $131 million. The District has not evaluated this estimate, but is now participating with the Bureau in the new study on an equal cost-sharing basis. It is anticipated that estimates of costs and quantities of water savings will be refined at the conclusion of this study. District staff will continue independent studies as well and may recommend retaining consultants for this purpose.

Expenditures on water conservation projects and programs, structural improvements as well as management programs, shall be made at the maximum level commensurate with funding capabilities.

G. 1985 AND SHORT-TERM CONSERVATION PLAN

1. Introduction

Short-term plans are those which will be implemented from 1985 to 1989. During this period, the emphasis will be on data collection and analysis to formulate long-term plans. The structural programs identified in the short-term plan are those which have proven to be beneficial.

A summary of the 1985 plan elements and the associated cost is presented in Table VI.1.

TABLE VI.1

1985 PLAN SUMMARY

PROGRAM	COST THOUSAND $
WATER BALANCE ACCOUNTING	
Delivery Accounting	5*
Tailwater Monitoring	280
Spill Monitoring	10*
Canal Seepage Study	5*
Leaching Requirement	57.5
STRUCTURAL PROGRAMS	
Canal Lining	2,250
Regulatory Reservoir	1,200
Non Leak Gates	10*
Remote Control Equipment	180
OPERATIONAL PROGRAMS	
Remote Control Study	60
Personnel Training	2*
ADMINSTRATIVE PROGRAMS	
Additional Personnel	200
Tailwater Assessment	325
EDUCATIONAL PROGRAMS	
Pilot Tailwater Recovery Systems	300
Conservation Education	2.5
Field Irrigation Demonstration	2.5
Irrigation Training	7.5
CO-OPERATIVE PROGRAMS	
USBR Co-Operative Study	162
USDA Lateral Fluctuation	250
DWR/USDA Drain Water Reuse	2
Fish & Game Drain Water Reuse	100
USBR Irrigation Scheduling	200
RESEARCH PROGRAMS	
Spill Interceptor Study	50
Modified Demand Irrigation	3
Computerized Water MGMT. Study	7.5
OVERHEAD CHARGES	710.8
Subtotal	6,307.3
* Items are included in the Operation and Maintenance Budget	95
Total	6,402.3

2. Water Balance Accounting

a. Delivery Accounting Program

The District's present water billing policy is to charge for water ordered, which may differ from water delivered. For billing purposes, a flow of one cfs for 24 hours is considered to be two acre-feet. Unless the zanjero must deliver a different flow rate due to physical limitations, the user is billed for the amount ordered. Users are billed for increases in water orders but are not given credit for decreases, in accordance with the 21-Point Program.

When a user has his delivery changed from one headgate to another on the same canal, the charge is prorated between the two accounts based on time of run for each headgate. If a user is allowed an additional few hours to finish an irrigation, the billing is prorated.

It is obvious that present billing records cannot be used to account for the actual quantity of water delivered to users. In 1985, an accounting procedure will be adopted which will provide for separate accounting of water delivered and water billed.

b. Tailwater Monitoring Program

The current program, in effect since 1976, of monitoring tailwater runoff and applying assessments for excessive runoff,

has been described earlier.

This program has lost a great deal of its effectiveness for several reasons, mainly:

(1) Limited times which tailwater can be checked;

(2) Provisions which allow water users to move water to another field.

The purpose of the program has been to encourage water users to reduce tailwater by ordering less water, cutting back the stream size, or changing their sets at the proper time.

The Water Conservation Advisory Board has been discussing this program, with the intent of proposing revisions. The Board has supported the District's program and seems to feel that efforts must continue to monitor tailwater and apply assessments to reduce excessive tailwater.

At the public hearing on September 20, 1984, those water users who testified seemed to oppose the use of recorders on all tailwater structures. However, no constructive suggestions have been presented to modify the program.

The District Board authorized several changes in the tailwater monitoring program at their November 6, 1984 regular meeting. The first was the adoption of a resolution revising Regulation No. 39, providing for standardizing tailwater structures. A copy of the new regulation is contained in the Appendix.

In 1985, working with the Advisory Board, District staff will recommend a revised tailwater monitoring program which will replace and supersede the 13 and 21-Point Programs.

The District Board has also authorized a tailwater monitoring study program to aid in revising the existing assessment program.

Description of Program:

Lease/purchase several recorders from different companies to determine the best type of recorders to purchase for the rest of the study;

Begin to install recorders on up to 15 percent of the fields to monitor tailwater and delivery;

Determine what is "reasonable" tailwater;

Identify high tailwater farms;

Evaluate the effectiveness of the current assessment program.

To evaluate the effectiveness of the current assessment program, a reporting procedure was also put into effect in September 1984 and the reports are included as Exhibit VI.2. The purpose of this report is to track the checks made on every tailwater structure.

IID - COC - TAILWATER MONITORING SUMMARY

Month October, 1984

Date	HEADS RUNNING			HEADS SPILLING OVER 15%			
				First Check		Assessed	
	Total	Checked	%	Heads	%	Heads	%
1	514	458	89.1	14	2.7	3	0.6
2	546	496	90.8	20	3.7	11	2.0
3	583	508	87.1	31	5.3	10	1.7
4	550	491	89.3	25	4.5	5	0.9
5	568	485	85.4	23	4.0	8	1.4
6	541	446	82.4	22	4.1	7	1.3
7	455	386	84.8	16	3.5	5	1.1
8	486	414	85.2	26	5.3	10	2.1
9	538	470	87.4	27	5.0	10	1.9
10	523	442	84.5	21	4.0	10	1.9
11	503	430	85.5	20	4.0	12	2.4
12	506	427	84.4	22	4.3	6	1.2
13	479	427	89.1	21	4.4	7	1.5
14	403	342	84.9	12	3.0	4	1.0
15	452	390	86.3	17	3.8	5	1.1
16	500	407	81.4	19	3.8	5	1.0
17	498	440	88.4	18	3.6	9	1.8
18	533	470	88.2	36	6.8	14	2.6
19	531	448	84.4	29	5.5	10	1.9
20	477	421	88.3	12	2.5	7	1.5
21	397	334	84.1	10	2.5	5	1.3
22	442	368	83.3	11	2.5	2	0.5
23	450	392	87.1	16	3.6	5	1.1
24	464	405	87.3	23	5.0	9	1.9
25	480	423	88.1	25	5.2	3	0.6
26	468	403	86.1	22	4.7	6	1.3
27	444	386	86.9	21	4.7	7	1.6
28	372	310	83.3	14	3.8	3	0.8
29	441	383	86.8	11	2.5	3	0.7
30	462	391	84.6	22	4.8	5	1.1
31	433	380	87.8	12	2.8	4	0.9
Total	15 039	12 973	86.3	618	4.1	210	1.4
Avg.	485	418		20		7	

Exhibit VI.2

IID - COO - TAILWATER MONITORING SUMMARY

Month NOVEMBER, 1984

Date	HEADS RUNNING			HEADS SPILLING OVER 15%			
				First Check		Assessed	
	Total	Checked	%	Heads	%	Heads	%
1	458	381	83.2	20	4.4	5	1.1
2	442	375	84.8	16	3.6	4	0.9
3	417	361	86.6	5	1.2	2	0.5
4	350	292	83.4	5	1.4	1	0.3
5	411	343	83.5	8	1.9	1	0.2
6	413	347	84.0	15	3.6	1	0.2
7	396	338	85.4	21	5.3	6	1.5
8	437	386	88.3	14	3.2	4	0.9
9	433	346	79.9	14	3.2	5	1.2
10	366	301	82.2	10	2.7	1	0.3
11	283	238	84.1	7	2.5	3	1.1
12	383	327	85.4	10	2.6	3	0.8
13	371	313	84.4	15	4.0	3	0.8
14	393	329	83.7	14	3.6	5	1.3
15	401	346	86.3	19	4.7	6	1.5
16	395	328	83.0	21	5.3	4	1.0
17	345	296	85.8	9	2.6	1	0.3
18	237	194	81.9	7	3.0	1	0.4
19	318	271	85.2	6	1.9	2	0.6
20	352	289	82.1	13	3.7	3	0.9
21	350	309	88.3	9	2.6	3	0.9
22	205	153	74.6	5	2.4	3	1.5
23	267	212	79.4	5	1.9	4	1.5
24	184	138	75.0	3	1.6	1	0.5
25	142	97	68.3	3	2.1	1	0.7
26	173	142	82.1	4	2.3	2	1.2
27	216	173	80.1	11	5.1	1	0.5
28	231	181	78.4	9	3.9	1	0.4
29	307	251	81.8	5	1.6	2	0.7
30	305	268	87.9	12	3.9	5	1.6
31							
Total	9 981	8 325	83.4	315	3.2	84	0.8
Avg.	332.7	277.5		10.5		2.8	

Exhibit VI 2A

TAILWATER MONITORING SUMMARY

MONTH: DECEMBER, 1984

	HEADS RUNNING			HEADS SPILLING OVER 15% FIRST CHECK		ASSESSED	
DATE	TOTAL	CHECKED	PER CENT	HEADS	PER CENT	HEADS	PER CENT
1	346	242	69.9%	5	1.4%	0	0.0%
2	248	158	63.7%	2	0.8%	1	0.4%
3	299	203	67.9%	4	1.3%	0	0.0%
4	259	176	68.0%	11	4.2%	2	0.8%
5	267	192	71.9%	9	3.4%	5	1.9%
6	257	177	68.9%	18	7.0%	4	1.6%
7	252	165	65.5%	12	4.8%	1	0.4%
8	262	139	53.1%	0	0.0%	0	0.0%
9	171	77	45.0%	2	1.2%	0	0.0%
10	207	104	50.2%	1	0.5%	0	0.0%
11	143	56	39.2%	2	1.4%	0	0.0%
12	125	45	36.0%	3	2.4%	0	0.0%
13	151	66	43.7%	3	2.0%	0	0.0%
14	184	95	51.6%	0	0.0%	0	0.0%
15	211	115	54.5%	6	2.8%	0	0.0%
16	167	91	54.5%	7	4.2%	0	0.0%
17	226	139	61.5%	7	3.1%	0	0.0%
18	281	187	66.5%	7	2.5%	2	0.7%
19	239	150	62.8%	7	2.9%	0	0.0%
20	257	168	65.4%	8	3.1%	5	1.9%
21	362	248	68.5%	6	1.7%	1	0.3%
22	317	229	72.2%	11	3.5%	5	1.6%
23	264	170	64.4%	7	2.7%	2	0.8%
24	176	86	48.9%	8	4.5%	3	1.7%
25	105	21	20.0%	1	1.0%	0	0.0%
26	228	116	50.9%	6	2.6%	0	0.0%
27	173	23	13.3%	0	0.0%	0	0.0%
28	101	12	11.9%	0	0.0%	0	0.0%
29	78	7	9.0%	0	0.0%	0	0.0%
30	74	8	10.8%	0	0.0%	0	0.0%
31	79	10	12.7%	0	0.0%	0	0.0%
TOTAL	6509	3675	56.5%	153	2.4%	31	0.5%

As can be seen in the reports, apparently not all running heads are being checked or in a few cases, more than those running are being checked. This variance occurs for various reasons. First, in some cases, the heads running include deliveries to nonagricultural customers. In those cases the percentage of heads checked to heads running would show up as less than 100 percent, even though all tailwater structures were checked. In some cases, the report shows checks on more than 100 percent of running heads. This occurs when a running head is split into two and both are checked, but only one shows up as a running head. During 1985, in conjunction with the delivery accounting program, both of these discrepancies in the accounting procedure will be resolved. In any case, all running heads are checked for tailwater.

c. Spill Monitoring Program

There are 241 locations where water can be spilled from District canals. These spill amounts are generally small and represent the mismatch between water released to a lateral canal, seepage and actual deliveries to farmers.

Most canals spill into the drainage system, and the water finds its way to the Salton Sea. At some of these spill locations, reservoirs have recently been installed.

A complete listing of the spill locations is included in the Appendix. Indeed, within the Appendix is included a complete listing of both main and lateral canals within the District, separated by divisions, listing the lengths of both earth-lined and concrete-lined reaches for each canal. Canals without

spill structures are listed as having "no spill", where as canals with spill structures have the places of spill deposition listed.

Spill monitoring data for the years 1972-74 are available for the main canals. From 1975 to 1979, seven or fewer laterals were added to the spill monitoring program. By 1980, there were 15 monitoring sites, while in 1984 there were 31 sites. Spill records for each site consist of daily records of the flow rate, measured in cubic feet per second, at the head and tail ends of each canal.

A statistical study of the above data was performed in order to extrapolate the total amount of spill occurring in the District. It was found that the sampling was not adequate for the purpose of extrapolating with confidence, although a formidable number of spill measurements were taken. It is planned that in 1985 a statistical sampling plan for measureing spills will be formulated so that implementation can begin within a short time.

An annual memorandum report would be prepared on the monitoring program. This report would include at least:

1) Inventory of spill locations;

2) Map of spill locations;

3) Record of spill amounts recorded;

4) Estimate of total annual spill for operation;

5) Estimate of total annual spill for maintenance purposes;

6) Recommendations on need for changes in program;

7) Recommendations regarding any specific spill location. Analysis of various operating records and discussion with District superintendents and to determine if recorders should be installed on any other specific spill locations.

d. Canal Seepage Study

The monitoring and determination of the amount of canal seepage for all canals are difficult. Canal seepage will decline over the years. There are approximately 642 miles of unlined laterals. Until recently, the priorities for lining laterals were based on cooperative agreements between the District and the landowner. Under these agreements, the landowner paid for a portion of the cost of the lining. This was a beneficial program because those landowners which were interested in participating financially were those where seepage presented a problem. In addition, by financially sharing the burden, the District was able to line a greater distance of laterals. This joint cooperation and participation have declined markedly in the last few years due primarily to the fact that the existing laterals are not causing seepage problems to the adjoining landowners. Because of this, the District assumes full responsibility for prioritizing canal lining. There is no longer joint participation with the adjoining landowners.

The District has prioritized the lining of laterals based on:

1) U.S. Bureau of Reclamation Study List;

2) Filling in gaps between lined portions;

3) Canal reaches reported by Division Superintendents to have high seepage;

4) Maintenance problems (hydrilla is principal problem).

The current priority list of canals to be lined within each Division is shown in the Appendix.

To quantify the amount of lateral canal seepage, the following program will be implemented in 1985. First, a map showing all unlined sections of laterals will be prepared along with an inventory thereof. These will be rated as to expected seepage characteristics in general terms of high, low and lowest. Superimposed on the map will be a soils map which should aide in the determination of seepage rates. Several seepage measurements will be made per year using ponding studies. Using the aforementioned map and the results of the ponding tests, an annual estimate will be prepared of the total seepage in unlined laterals. An annual memorandum report will be prepared in which relevant data, test results and an annual estimate of seepage will be reported.

With respect to seepage and the inventory, thereof, it is noted that there are many miles of laterals within the District which

will probably never be lined. These laterals, for example, are those which are infrequently used, in very tight soil, where it can be demonstrated that they may be gaining water, or for other reasons. It is estimated that the laterals that fall into this classification represent approximately 37 miles. This therefore leaves the following classification of unlined laterals within the Imperial Irrigation District:

Priority	Mileage
Highest	510
Low	94
Lowest	37
Total Miles	642

Seepage in the main canal system will be addressed this year by a study to be conducted by USBR in cooperation with the District. This study is intended to quantify seepage in the East Highline Canal, by measuring the inflow and outflow in each reach of canal. Similar studies may be conducted on the other main canals in the future if the USBR study proves effective.

e. Leaching Requirements

The leaching requirement is the amount of water required to dissolve and transport enough salts through the soil profile to maintain a salt balance favorable to economic plant growth. The leaching requirement depends on crop tolerance and water

quality. In Chapter III-C Section 1, discussion of the leaching requirements for crops within the District was given.

In Table III.12 was presented the average theoretical leaching requirements for the major Imperial Valley crops; the overall average was shown to be 0.6 acre-feet per acre.

The District's major concerns with respect to leaching requirements are that the water applied for leaching purposes is both needed and applied efficiently. To address these concerns it is necessary to perform on-farm water balance computations that quantify the amount of water utilized for leaching. Leaching water either percolates deep into the soil - "Deep Percolation" - which cannot practically be measured directly; or is conveyed through the tile drainage system.

A description of the District's drainage system has been given in Chapter III of this report. Therein it was explained that the District's drainage system is designed to accept discharge from farm tile drain outlets, normally one outlet for each 160-acre plot. In locations at which a drain cannot be maintained at sufficient depth, the District provides and maintains a sump and pump. At present there are 485 drainage sumps within the District.

Acreage with tile drainage that is pumped in sumps represents about one-fifth of the total acreage within the Valley. The remainder of the tile outlets discharge directly into drains, and these flows are not readily monitored. Presently the District computes volumes of water pumped in 235 of its sumps, determined from power usage (kwh) as measured on electric

meters located at each sump. Calibrations to determine the power usage per volume of water pumped are performed on a quarterly basis. Annual tile discharge is then determined by proration, using both the acreage served by tile drains, and miles of tile lines installed, as proration factors. See Exhibit VI.3 for a typical tile drain discharge report.

In Figure VI.4 is shown the sampling area represented by the tile sump measurement program. It can be seen that a large area in the eastern portion of the District does not have sumps and hence is not included within the current tile discharge study. The intent of the Tile Flow Monitoring Study will be to augment the District's current sump study by installing recorders on ten tile outlets in the areas of the District not covered by sumps. This data will be used to establish flows from tile from the whole District as part of the total water budget.

To complete the water budget, however, it will be necessary to quantify the deep percolation water. Based on methods outlined by Lonkerd, Ehlig, and Donovan 1/, it should be possible to determine actual leaching water quantities. In this method, representative soil cores are taken, and the following parameters are measured to determine the in-situ leaching fraction; soil saturation percent, electrical conductivity, and chloride ion concentration of the saturation extract. It is planned to perform this test on 20 fields to correlate the leaching fraction with soil type, crop tile flow, salinity, and other relevant parameters.

1/ Lonkerd, W. E., Ehlig, c. f. nad T. J. Donovan, "Salinity Profiles and Leachin Fractions for Solowly Permeable Irrigated Field Soils," Soil Science Society of American Journal, Vol. 43, No. 2, March - April 1979.

IMPERIAL IRRIGATION DISTRICT

TILE DRAIN DISCHARGE
Progress Report
Based on Measured Discharge from Sumps
March 1983 to November 1983

Sumps in Program	235
Sumps with valid measurements	227
Miles tiled (227 sumps)	3,074
Acreage tiled (227 sumps)	42,789
Calculated discharge, g.p.m. (227 sumps)	14,657
Calculated discharge, g.p.m. each sump	65
Calculated discharge in A.F. per year (227 sumps)	23,642 A.F.

Acre Feet per year, per sump:
23,642 A.F. / 227 — 104.15 A.F.

Assume 534 sumps operating:
Total discharge for year — 55,616 A.F.

Estimated total tile effluent for 1983, based on 227 sump tests made during the period March 1983 to November 1983

Cumulative miles of tile as of December 1983	28,972
Discharge for 3,074 miles of tile	23,642 A.F.
Discharge per mile of tile	7.69 A.F.
Total discharge (28,972 x 7.69)	222,822 A.F.

Cumulative acres tiled as of December 1983	431,224
Discharge for 42,789 acres	23,642 A.F.
Discharge per acre tiled	0.55 A.F.
Total discharge (431,224 x 0.55)	238,262 A.F.

Note: Sump discharge determined by calculating KWH per acre foot of water pumped from field tests. Annual discharge then computed from total KWH taken from power bills for the period March 1983 November 1983

Water Engr Sec 1/26/85
cc: Mr. Twogood
Mr. Shreves
Mr. Wilson
Mr Havens

3. Structural Programs

a. Canal Lining

As in the past, canal lining will continue to be an integral part of the water conservation program. The benefits derived from reducing seepage include reduction in maintenance, increased conveyance efficiency, reduced right-of-way land requirement, etc. Lining is a good practice for upgrading the overall system.

Concrete has been found by the District to be the most cost effective material for lining due to its structural properties and ease of maintenance. The flatter side slopes required in order to use membrane liners would increase the cross-sectional area and right-of-way requirements, and would be more susceptible to damage from maintenance activities.

For 1985, the District has budgeted $2.25 million for canal lining. Areas found to have high seepage rates have been identified and are listed by Division in the table following. Several factors other than seepage rate are considered when formulating the canal lining schedule. Canals with aquatic weed infestations (in particular, hydrilla) are given high priority. Other canals with high priority include those laterals which are partly lined and require only minor amounts of lining to be completed.

A preliminary canal lining schedule for 1985 has been prepared and is included as Table VI.2. Also, within this table are the estimated amounts of seepage water that will be saved, a total

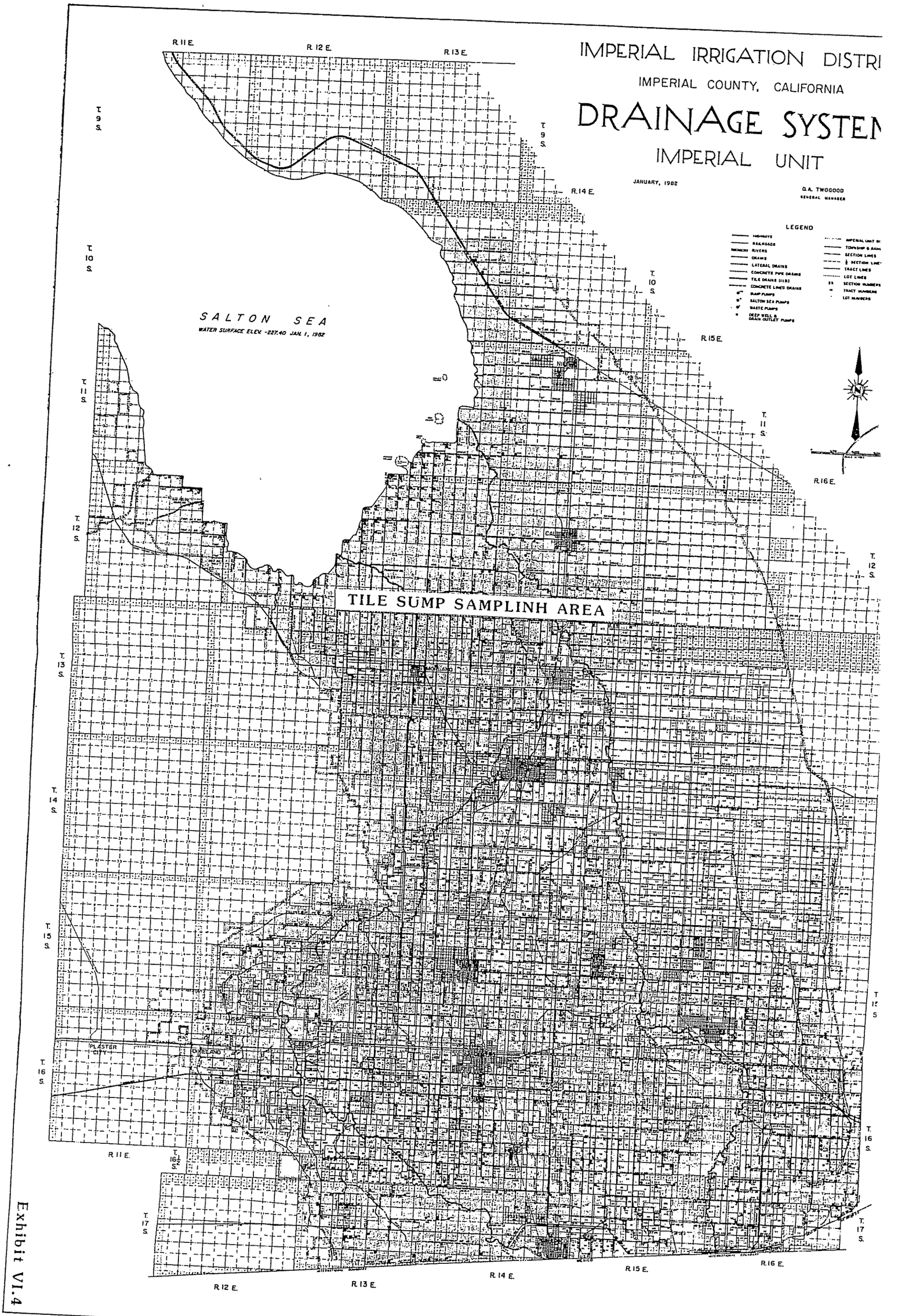


Exhibit VI.4

8201

TABLE VI.2

CANAL LINING SCHEDULE FOR 1985 BUDGET*

Scheuled Constr. Date	Canal	Length** Miles	Estimated Cost, $	Est.*** Salvage AF/Yr.
Jan. 21-25	Mulberry	1.5	85,800	117
Feb. 4-8	Wormwood	1.25	154,500	9
Feb. 11-15	Eucalyptus	1.0	150,200	200
Feb. 28-Mar. 1	Palm	1.0	90,300	23
Mar. 4-8	Wormwood	1.0	144,800	7
Mar. 11-15	Eucalyptus	1.0	133,700	200
Mar. 18-22	Ash Lateral	1.75	209,000	44
Apr. 1-5	"E" Lateral	1.5	110,900	162
Apr. 15-19	Elder	2.0	310,300	400
Apr. 29-May 3	Pear	0.75	72,000	150
May 6-10	Pampas	0.60	49,500	85
May 13-17	Oxalis	1.65	131,300	233
May 20-24	Mesquite	1.0	72,100	78
Unknown	Sumac Sumac Lat. 1	1.1	135,000	87
Unknown	Mulberry	1.5	120,000	117
	TOTALS	18.6	1,969,400	1,912

*Preliminary, subject to weather, canal outages, etc.
**lengths are approximate
***Based on figures from USBR study, Water Conservation Opportunities"

of 2,200 AF per year, as a result of this lining, based on USBR preliminary studies.

Short Term Plans:

Continue with $2 - 3 million annual budget, which would finance the lining of approximately 100 miles of lateral canals, and possibly the partial lining of a main canal. With additional funding, up to $5-8 million could be spent on canal lining each year, limited by canal cutout scheduling.

b. Regulatory Reservoirs

Construction of a $1.3 million regulatory reservoir has been scheduled for 1985, to be located on the Westside Main Canal at the Trifolium Extension heading. Design parameters will include automatic inlet and remote-controlled pump outlet. Total capacity will be approximately 300 AF and will be contained in an area of 30 acres. The embankments will be concrete lined.

Placement of a regulating reservoir in this area is important due to its location adjacent to the Trifolium Extension spill structure. The Trifolium Extension is in the extreme northwest corner of the irrigation system requiring water to travel approximately 60 miles in the Westside Main Canal after diversion from the All-American Canal. It is estimated that the strategic placement of a regulatory reservoir in this location would conserve 4,100 AF a year in operational spill.

Short Term Plans:

By 1990, it is planned to construct at least two reservoirs at main canal spill locations and to study the effects of other conservation efforts on storage reservoirs. With additional

funding, the District could build two each year over the next two to three years.

Potential sites for reservoirs are shown on Exhibit VI.5. These sites are adjacent to main canal spill locations except for the site on the No. 11 Check on the East Highline Canal.

c. Non-Leak Gates

Beginning in 1985, the Imperial Irrigation District will begin to replace the standard timber slide gates on spill structures with aluminum gates. This will become part of the District's normal maintenance program to eliminate leakage from spill structures.

d. Remote Control Equipment

Equipment necessary for the remote-controlled operation of the Central Main Check on the All-American Canal will be purchased, and installation will commence in 1985. It is planned to purchase equipment that will be compatible with the new equipment planned for Water Control Section and therefore, this station will not be operable until the central equipment is on line.

4. Operational Programs

a. Computer Enhanced Remote-Control System

A study will be made to determine the type and functions of a

computerized SCADA system and any changes necessary to the communication network. Specifications will be prepared for procurement of equipment in 1986.

Short Term Plans:

Presently, the District controls lateral headgates at 22 sites by remote control from its operating headquarters using an analog electrical signal transmitted across pole lines. It is planned to convert this to the much more accurate and trouble-free digital system and use a computer to manipulate data.

b. IID Personnel Training

The zanjero training program will continue in 1985 with formal training scheduled for six new zanjeros and refresher classes scheduled for current personnel. This program will continue as part of the normal on-going training.

5. Administrative Programs

a. Additional Personnel

Six additional zanjeros will be employed in 1985, one for each division. This will provide more flexibility to make off-schedule changes in the delivery system and monitor tailwater. Four additional positions will be filled for water conservation.

b. Tailwater Assessment Program

The program begun in 1976 with the 13-Point Program will be continued through its ninth year during 1985.

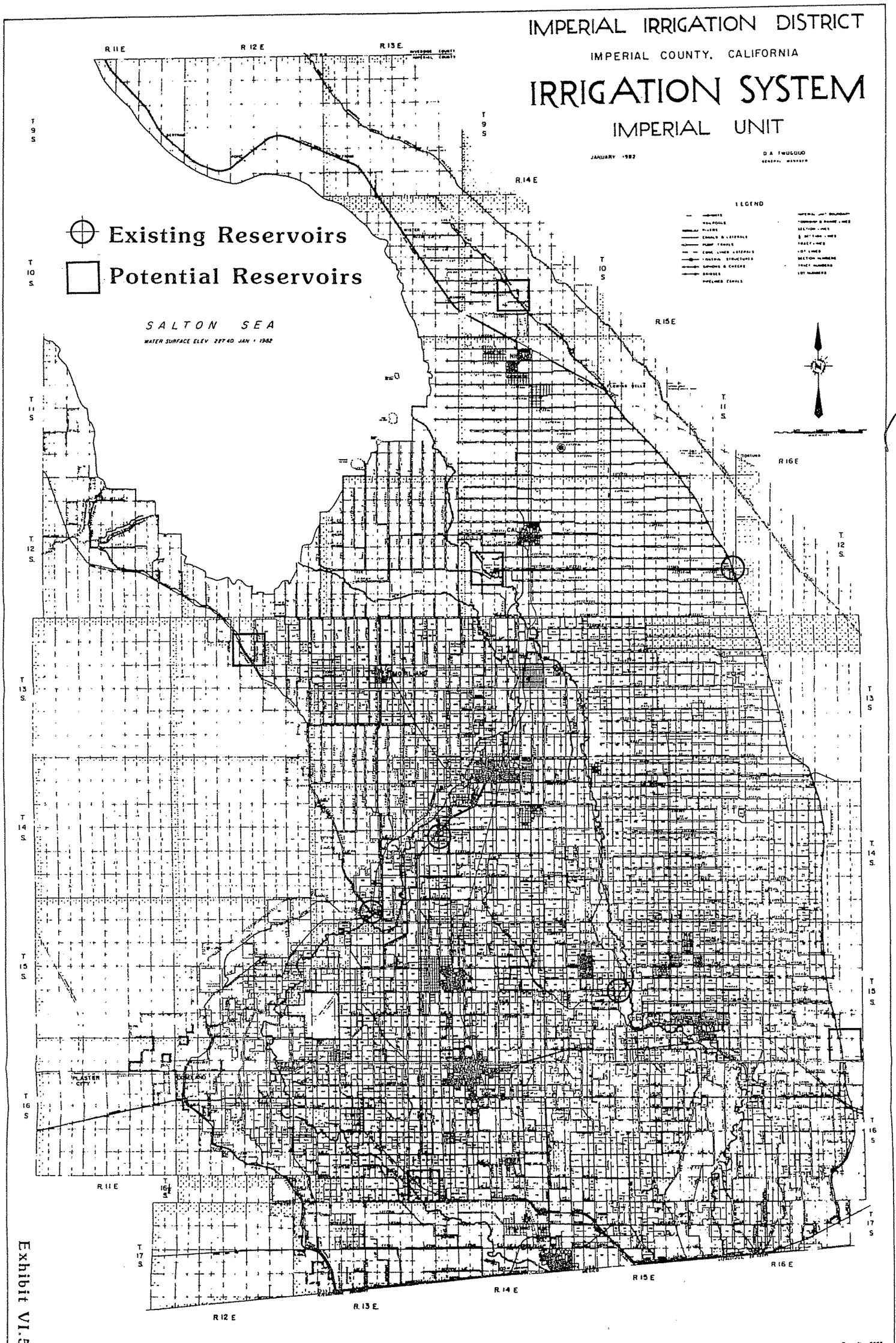

IMPERIAL IRRIGATION DISTRICT
IMPERIAL COUNTY, CALIFORNIA
IRRIGATION SYSTEM
IMPERIAL UNIT
JANUARY 1982
D. A. TWUDDUD
GENERAL MANAGER
LEGEND
Existing Reservoirs
Potential Reservoirs
SALTON SEA
WATER SURFACE ELEV 227.40 JAN 1 1982
R11E
R12E
R13E
R14E
R15E
R16E
T9S
T10S
T11S
T12S
T13S
T14S
T15S
T16S
T17S
Dwg No 8823

Exhibit VI.5

The Water Conservation Advisory Board has periodically made recommendations for revisions to this program as described earlier. A high priority will be given by that group working with District staff and management to throughly evaluate, and consider recommending changes in this program to the District Board in 1985.

The three general categories to be addressed are (1) Tailwater monitoring and assessments, (2) changing water orders, and (3) moving water. It is proposed that a new program will be developed which will replace and supersede the 13 and 21-Point Programs and be incorporated into the operating Rules and Regulations.

6. Educational Programs

a. Demonstration Tailwater Recovery

This program will determine the effectiveness, potential problems encountered, and associated costs of tailwater recovery systems on different soils, slopes, crops, etc. Two to five tailwater recovery systems will be constructed and delivery, recycled tailwater, tailwater salinity, soil salinity, temperature, etc. will be monitored. In November 1984, the Board authorized staff to proceed with planning and implementation of a pilot of tailwater recovery program, as described below:

1) Farmed unit 70 acres or more;

2) Location adjacent to well-traveled road;

3) Electric power readily available;

(4) Continuous cropping;

(5) Full cooperation of water user;

It is planned to continue to evaluate the program, and expand if warranted.

b. Conservation Education

Newspaper articles, brochures and instruction booklets relating to water conservation will be released through the Public Information and Community Services Section of the District.

c. Field Irrigation Demonstration

Four field irrigation demonstrations will be conducted. The agenda will consist of items such as:

(1) Irrigation scheduling with the Neutron Probe;

(2) How to measure water;

(3) Cutback irrigation;

(4) Irrigating with minimum tailwater.

d. Irrigation Training Program

Ten growers and their irrigators will be trained and educated

to irrigate with minimum tailwater. A series of video irrigation training programs will be developed.

7. Cooperative Programs

The District participates with governmental agencies in several study programs related to the conveyance and usage of water within the Valley.

a. USBR/IID Cooperative Study

The District has pledged to the USBR to cooperate in that agency's current study entitled "Imperial Irrigation District Canal and System Improvement" (CLSI) investigation, a continuation of its earlier studies which "...identified a number of structural and nonstructural conservation measures warranting further study," according to the Bureau's Plan of Study. Based on 50 percent cost sharing, the District has budgeted $162,000 to be expended primarily on installation of measuring devices and the collection of records necessary to determine current losses and future quantities of water salvaged by conservation facilities and programs.

This program, as proposed by the USBR, will extend over a three-year period, although USBR has agreed to give priority to study seepage losses in the East Highline Canal and an 8,000 AF capacity reservoir on the All-American Canal.

Depending on the results of the study and funding availability, construction of the reservoir, or lining and other structural changes on the East Highline, may begin.

b. USDA/IID Lateral Fluctuation

Fluctuations and the unpredictability of water deliveries adversely affect irrigation efficiency. To consistently maintain high irrigation efficiencies, predictable nonfluctuating deliveries are required.

Transient flow characteristics in the Myrtle and Munyon Laterals will be monitored. The heading of the Myrtle Lateral is located immediately upstream of a check. The water level fluctuations in the Munyon Lateral are expected to be much greater than in the Myrtle Lateral. A broad-crested weir will be installed downstream from each check to account for flows; and water level recorders and transducers will be installed to monitor water levels upstream and downstream from all checks, and at the head of each delivery ditch. After 3 - 6 months, structural modifications (concrete lining, automated structures, mid-lateral reservoir, etc.) will be made and changes in the transient flow characteristics will be monitored.

c. USDA/IID Drain Water Reuse Study

The District signed an agreement, see Appendix, with the Department of Water Resources and the USDA to cooperate in a special study of using drain water for irrigation. Continuation of this program requires an allocation of $2,000 for electrical pumping energy.

d. Drain Water Reuse

A pond will be constructed at the outlet of Elder 14 Drain into New River. Approximately 825 AF of drainage water will be

diverted each year to the waterfowl habitat area. The location of this facility is shown on Exhibit VI.6.

The District has installed structures in drains to divert water into adjacent lands of the State Department of Fish and Game to provide wildlife habitat. Additional sites where drain water can be diverted will be identified and structures installed as necessary. This program will reduce the amount of fresh water used for wildlife habitat.

e. Irrigation Scheduling with Neutron Probe

The Irrigation Scheduling Program conducted in cooperation with the USBR for the past 4 years, and described earlier, will be continued through 1985. Furthermore, analyses and reporting of the data collected will be accomplished.

The 1985 program will focus on involving water users who have not participated previously. Efforts will be made to include water users who have been identified as frequently having high tailwater runoff, for the main goal of this program is to schedule water more accurately and thus reduce the quantity of tailwater.

It is expected that between 12,000 and 15,000 acres will become involved in this next year's program.

f. SCS Trifolium Project

The District has submitted a proposal to the U. S. Soil Conservation Service to seek funding for extensive water conservation measures in the Trifolium Extension area of its irri-

gation system. Included are the concrete lining of 35 miles of canals, the construction of a regulating reservoir on the Westside Main Canal system, and the implementation of extensive on-farm irrigation strategies.

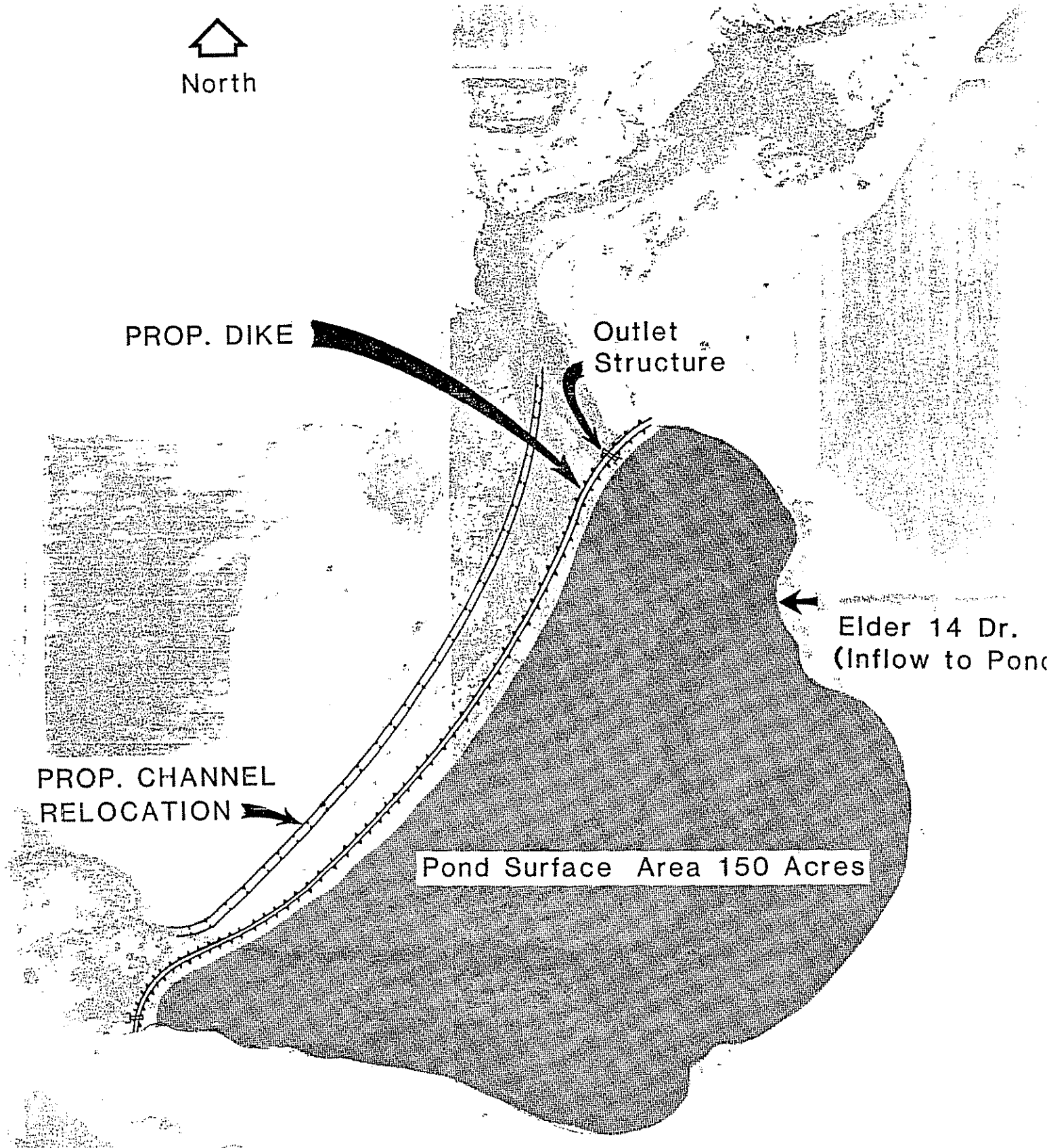
It is expected that the SCS can provide more extensive on-farm assistance than the District alone could provide, and it is hoped that the project will expand to encompass other areas of the District.

8. Research Programs

a. Spill Interceptor Pilot Program

This pilot program will be to study the effects that a spill interceptor system will have on lateral spill, operational flexibility and tailwater discharge. Five laterals have been identified as the study area as shown on Exhibit No. VI.7, located in the East Highline Canal system, from which spill currently flows into the Alamo River. Both spills and drains in the study area will be measured to obtain baseline data for comparison with data gathered after construction of interceptor system. Final design of the facilities and construction will begin in 1986.

In the future, the District will continue the spill interceptor study to be begun in 1985, and design and construct a pilot spill interceptor system and evaluate the results. If warranted, design of full-scale system will be initiated.



Depth Varies 0-10 Feet
Average Inflow 3.5 c.f.s.
Average Height Of Dike From
Natural Surface 4 Feet

DRAIN WATER
REUSE POND
New River West of U.S.N.A.F.
Tr. 42 & Pt. N. 1/2 Sec. 35
T.15 S. - R.12 E.

Exhibit VI.6

b. Modified Demand Irrigation Trial

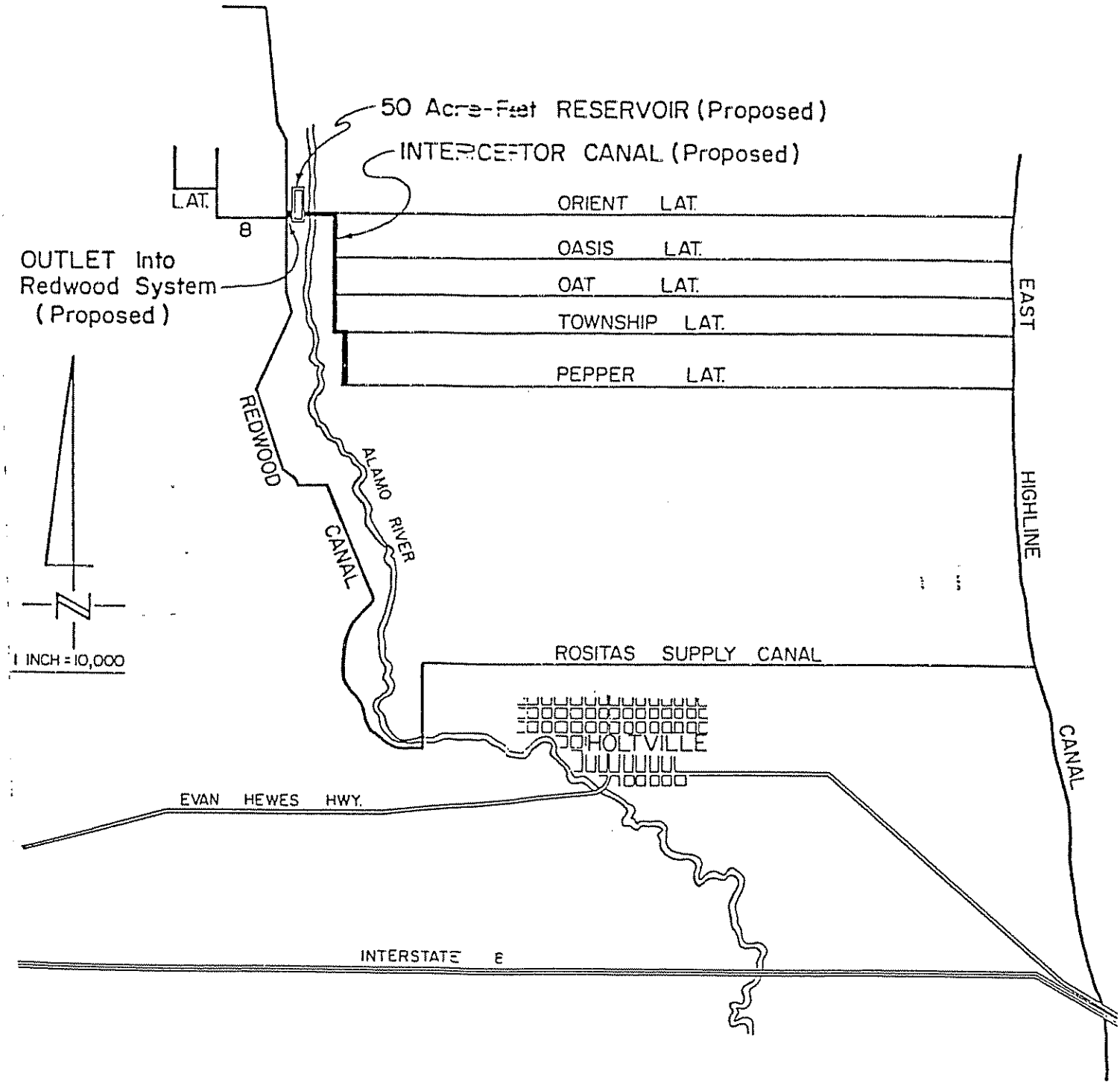
As previously discussed, this program allows the irrigation to be terminated up to four hours before or after the regular ending time. An analysis of the data gathered in this trial will be completed and recommendations for changes in the program will be made.

c. Computerized Water Management Study

The USBR has developed a program to provide assistance to irrigation districts that operate or are served by Bureau projects and facilities. The program utilizes a modular system of 11 individual computer programs to assist the district and farmers in water management. This program will initially be tested on one or two zanjero runs.

d. Delayed Start

Presently most irrigations start between 6:00 a.m. and 11:00 a.m. If the farmer realizes that he is going to finish the irrigation early there are no District personnel available before 6:00 a.m. to make any changes. If the official start time of the zanjero's run was delayed two hours he would be available to make off schedule changes during his first two hours of the day. A delayed start trial will be implemented on the Myrtle Run to determine its conservation potential.



PROPOSED
SPILL INTERCEPTOR SYSTEM
Exhibit VI.7

Dwg. No. L-2334

H. LONG-TERM GOALS

It is presumptuous to list specific long-range goals with respect to water conservation. Goals for the structural programs identified in Section "G" can be projected based on the limited vision of this plan. It is expected that the majority of the canals will be concrete lined. Reservoirs will be constructed at main canal spills to recover that water. The system will be operated by remote control wherever practical. It should be kept in mind that these goals may change as more information becomes available as a result of the monitoring and measuring programs outlined in this plan.

It should also be mentioned that the conservation benefits that would accrue from the various programs overlap each other. Thus as some programs are implemented, other programs may appear less attractive. As an example, seepage recovery systems and concrete lining both conserve seepage water, and would not be installed in the same reach of the canal.

The economics of all potential measures will have to be considered. Many of the programs that have been discussed are very costly, and can only be implemented if funds are available from outside sources.

Through the implementation of the short-term programs listed in Subsection "G" above, it should be possible to initiate the long-term planning process. There is no doubt that water conservation will continue to have high priority in the District.

I. MISCELLANEOUS PROGRAMS TO REDUCE SALTON SEA INFLOW

The Water Conservation Plan is designed to reduce losses, most of which contribute to the inflow to the Salton Sea. Accordingly, other elements of inflow remaining unchanged, the level of the Sea is expected to decline. However, recognizing that conservation programs take time to implement, whether that time be 5 years or 20 years, other programs need to be considered which perhaps can be applied in a shorter time. Some of the possible alternatives are discussed herein.

Several proposals will be studied during 1985 which are not specifically in the Water Conservation Plan, including the following:

1) Spreading drain water on available idle land by ponding, flooding, or sprinkling;

2) Storm detention basins on the East and West Mesas, requesting Assistance from the U. S. Corps of Engineers;

3) Irrigation with free drain water through cooperation with volunteer landowners, alternating with canal water;

4) Pumping water from Salton Sea to shallow ponds adjacent to the Sea;

5) Pumping water from drains to shallow ponds on East and West Mesas, or other available lands, for wildlife ponds or marshes or other uses;

6) Support continued investigation of diverting New River at or south of Mexican border to Laguna Salada in Mexico;

7) Separating tile drain flows from tailwater to allow reuse of surface runoff.

J. ENVIRONMENTAL ISSUES

In accordance with the California Environmental Quality Act, the District has by resolution adopted the State CEQA Guidelines for application to the District.

These guidelines provide that certain programs are exempted from preparation of environmental assessments. Programs in this category include concrete lining existing District canals, pipelining portions of laterals and drains, installing road crossings, and replacing existing structures.

The District has prepared a declaration of negative impact for each of its regulating reservoirs, and will continue to file this type of enviornmental review for similar projects.

As major projects in the Water Conservation Plan are prepared for implementation, and environmental assessment, as required by the State guidelines, will be prepared.

The major environmental issues expected to be of concern are:

1) Reduction of flows in drains;

2) Reduction of inflow to Salton Sea;

3) Increase in salinity of drain waters;

4) The impact of these factors on fish and wildlife, recreation, and aesthetic values.

K. CONCLUSIONS

This Plan delineates specific projects and programs which either are proven to save water, or have a high degree of potential for conservation by increasing efficiencies of the District's systems and farmer's irrigation operations.

As stated in the introduction, this Plan is a general plan for improvements, both structural and nonstructural, of conveyance, storage, and irrigation facilities in Imperial Valley. Conservation of water will result from the actions described in the Plan.

The Plan should be reviewed annually by the Board of Directors, and modified as conditions change.

The time schedules and proposed future expenditures are obviously subject to review, for no one can predict the future.

As funds may become available from outside sources, schedules will be tightened and expenditures accelerated in order to accomplish the earliest construction of physical or structural works.

At this point, and presumably throughout the period of implementation, the Plan is a voluntary plan on the part of District water users. There will have to be continued monitoring of tailwater - there may be special assessments - and penalties - but by coordinated efforts, landowners and water users will continue to improve their use of water to ensure that it is used wisely.

APPENDED MATERIAL

APPENDIX A

IMPERIAL DIVISION

Main Canals	Spills Into	Earth	Concrete	Total	Acreage
Central Main	Central Main #4 Spill	8.00		8.00	
Westside Main	Dixie Spill	18.50		18.50	
Lateral Canals					
Dahlia Canal	Newside 1-A Drain	6.54	6.36	12.90	
Dahlia Lat. 1	Date Drain	.47	1.53	2.00	
Dahlia Lat. 4	No Spill		.24	.24	
Dahlia Lat. 5	Central Drain		.48	.48	
Dahlis Lat. 6	No Spill		.49	.49	
Dahlia Lat. 8	Newside Drain #1	1.51	2.49	4.00	
Dandelion	Newside Canal	3.48	1.02	4.50	
North Date	Rose Canal	2.09	5.41	7.50	
Date Lat. 4	Central Drain #11	.50		.50	
Date Lat. 5	No Spill	.50		.50	
Date Lat. 6	McCall Drain #5		1.50	1.50	
Date Lat. 7	No Spill	.50		.50	
Date Lat. 8	No Spill		.50	.50	
Date Lat. 9	Dolson Drain #1	1.25	.50	1.75	
Date Lat. 10	No Spill	1.50		1.50	
Date Lat. 11	No Spill	.75		.75	
Date Del. 36 P/L	No Spill		.50	.50	
Ebony	No. Central Drain		3.49	3.49	
Elder	Rice Drain #5	3.29	13.91	17.20	7100
Elder Lat. 1	Wildcat Drain		1.50	1.50	
Elder Lat. 2	No Spill	.80	.75	1.55	
Elder Lat. 3	Elder Drain #3	.25	.50	.75	
Elder Lat. 4	No Spill		.25	.25	
Elder Lat. 5	No Spill	.35	.50	.85	
Elder Lat. 5A	No Spill	.50		.50	
Elder Lat. 6	No Spill	.50		.50	
Elder Lat. 7	New River	.25	2.66	2.91	
Elder Lat. 8	No Spill		.99	.99	
Elder Lat. 10	Seeley Drain		1.00	1.00	
Elder Lat. 11	Sunbeam Lake		.63	.63	
Elder Lat. 12	No Spill	1.00		1.00	
Elder Lat. 13	Elder 13 Drain		2.60	2.60	
Elm	Rice Drain #5	2.76	2.74	5.50	
Elm Lat. 1	No Spill		.50	.50	
Elm Lat. 2	No Spill		.30	.30	
Elm Lat. 3	Rice Drain #3	.75	1.81	2.56	
Elm Lat. 4	No Spill		.47	.47	
Elm Lat. 6	No Spill		.55	.55	
Elm Lat. 7	No Spill		.25	.25	
Eucalyptus	New River	7.18	10.82	18.00	8220
Eucalyptus Lat. 2	Wildcat Drain	.61	1.71	2.32	
Eucalytpus Lat. 2B	Wildcat Drain		.36	.36	
Eucalyptus Lat. 4	Wildcat Drain		2.50	2.50	

IMPERIAL DIVISION (Con't.)

Lateral Canals	Spills Into	Earth	Concrete	Total	Acreage
Eucalyptus Lat. 5	Eucalyptus Canal	.30	3.80	4.10	
Eucalyptus Lat. 7	No Spill	.25	.50	.75	
Eucalyptus Lat. 10	Rice Drain	.53	2.02	2.55	
Eucalyptus Lat. 11	No Spill	.50	.50	1.00	
Eucalyptus Lat. 14	New River	1.40	.53	1.93	
Eucalyptus Lat. 17	North Central #1 Dr.		1.25	1.25	
Eucalyptus Lat. 18	Rice Drain	.50		.50	
Evergreen	Central Main Canal		7.73	7.73	
Fern	Fern Drain & Salt Creek Slough	.12	8.55	8.67	
Fern Lat. 1	No Spill	.15		.15	
Fern Lat. 2	No Spill		.35	.35	
Fern Lat. 3	No Spill		.51	.51	
Fern Lat. 4	No Spill		.20	.20	
Fern Lat. 7	No Spill		.17	.17	
Fern Lat. 8	No Spill		1.53	1.53	
Fern Lat. 9	No Spill		.49	.49	
Fern Side Main	No Spill	.50		.50	
Fig	Bullhead Slough		4.45	4.45	
Fig Lat. 2	No Spill		.50	.50	
Fig Lat. 4	Fern Drain #1	.16	.65	.81	
Fillaree	Fillaree Drain	5.51	2.39	7.90	4229
Fillaree Lat. 1	No Spill	.10	1.51	1.61	
Fillaree Lat. 1A	No Spill	.19	.21	.40	
Fillaree Lat. 2	No Spill	.75		.75	
Flax	Fillaree Drain #4	1.27	3.33	4.60	
Flax Lat. 1	No Spill		.24	.24	
Flax Lat. 1A	No Spill	.19	.21	.40	
Flax Lat. 3	No Spill		.50	.50	
Flax Lat. 6	No Spill		.30	.30	
Forgetmenot	Westside Drain #1	.20	3.00	3.20	
Forgetmenot Lat. 1	No Spill	.25		.25	
Forgetmenot Lat. 3	No Spill		.25	.25	
Foxglove	Dixie Drain #1	.40	8.80	9.20	
Foxglove Lat. 1	No Spill		.50	.50	
Foxglove Lat. 2	No Spill	.15	.25	.40	
Foxglove Lat. 3	No Spill	.05		.05	
Foxglove Lat. 5	No Spill		.02	.02	
Foxglove Lat. 7	No Spill		.80	.80	
Foxglove Lat. 11	No Spill		.20	.20	
Lotus	Lotus Drain		4.47	4.47	
Lotus Lat. 1	No Spill		.25	.25	
Newside	No Spill	4.09	3.71	7.80	
Newside Lat. 1	No Spill	.20		.20	
Newside Lat. 2	No Spill	.45		.45	
Newside Lat. 3	Newside Drain #1	3.00		3.00	
Newside Lat. 3A	No Spill		1.00	1.00	
Newside Lat. 4	Newside Drain	1.76	.09	1.85	
Newside Lat. 5	No Spill	.50	.50	.50	

IMPERIAL DIVISION (Con't.)

Lateral Canals	Spills Into	Earth	Concrete	Total	Acreage
Rice	No Spill		.33	.33	

	Total No.	Total Miles
Laterals with Canal Spills	4	23.83
Laterals with Drain Spills	38	165.33
Laterals with No Spills	53	36.04
Total	95	225.20

EL CENTRO DIVISION

Main Canals	Spills Into	Earth	Concrete	Total	Acreage
All American	New River	16.15		16.15	
Briar	Central Main Canal and A.A. Canal		2.54	2.54	
Central Main	Dahlia Spillway	16.20		16.20	
Rositas Main	Central Drain	9.63	1.51	11.14	
Westside Main	No Spill	6.90		6.90	
Lateral Canals					
Acacia	Rose Canal	6.29	4.11	10.40	
Acacia Lat. 1	No Spill	1.00		1.00	
Acacia Lat. 2	Central Drain #3-F	1.00		1.00	
Acacia Lat. 3	Acacia 5 Drain	.75.		.75	
Acacia Lat. 4	Acacia 5-B Drain		2.50	2.50	
Acacia Lat. 4A	Acacia 5-A Drain	.25	.50	.75	
Acacia Lat. 5	No Spill		.25	.25	
Acacia Lat. 5A	Acacia 5-A Drain	.48	1.27	1.75	
Acacia Lat. 6	Acacia Lat. 9	.25	1.00	1.25	
Acacia Lat. 6A	No Spill		.45	.45	
Acacia Lat. 8	No Spill		.30	.30	
Acacia Lat. 9	Central Drain	2.09	.50	2.59	
Acacia Lat. 10	No Spill	1.01	1.49	2.50	
Acacia Lat. 11	Central Drain #2	.50	.50	1.00	
Acacia Lat. 12	No Spill	.50		.50	
Alamitos	Acacia Canal and Central Drain #3	2.47	4.53	7.00	
Alamitos Lat. 2	No Spill	.24	.26	.50	
Alamitos Lat. 3	No Spill		.30	.30	
Alamitos Lat. 4	Central Main Canal	1.20		1.20	
Alamitos Lat. 4A	No Spill	.35		.35	
Alamitos Lat. 5	Central Drain #3-E		1.00	1.00	
Alamitos Lat. 6	Central Drain #3		1.25	1.25	
Alamitos Lat. 8	Central Drain #3-C		2.00	2.00	
Alder	Dogwood Lat. #6	5.32	7.18	12.50	
Alder Lat. 1	No Spill		.50	.50	
Alder Lat. 2	No Spill	1.00	.50	1.50	
Alder Lat. 3	Alder 2 Drain	1.00		1.00	
Alder Lat. 5	No Spill		1.00	1.00	
Alder Lat. 5A	No Spill		.50	.50	
Alder Lat. 6	No Spill		.50	.50	
Alder Lat. 7	Central Drain #6	2.05	1.70	3.75	
Alder Lat. 10	No Spill	.25		.25	
Alder Lat. 11	Central Drain #3		.25	.25	
Alder Lat. 12	No Spill		.49	.49	
Beech Lateral	New River	.50	6.24	6.74	
Beech Lat. 1	No Spill		.34	.34	
Beech Lat. 2	No Spill		.49	.49	
Birch	A.A. 8-A Drain #1		2.00	2.00	

EL CENTRO DIVISION (Con't.)

Lateral Canals	Spills Into	Earth	Concrete	Total	Acreage
Birch Lat. 1	No Spill	.25		.25	
Birch P-2 Lat.	A.A. Drain #10	1.13		1.13	
Birch P-2 Pipeline	No Spill		.50	.50	
Birch Lat. 3	Birch 3 Drain		1.06	1.06	
Birch Lat. 4	No Spill		.25	.25	
Briar Lat. 8	No Spill		.06	.06	
Daffodil	Heber Drain	.78	2.72	3.50	
Daffodil Lat. 1	No Spill		.50	.50	
Daffodil Lat. 2	No Spill	.16	.34	.50	
Dogwood	Rose Canal	8.11	6.09	14.20	
Dogwood Lat. 1	No Spill	.50		.50	
Dogwood Lat. 2	Dogwood Main	2.47	3.53	6.00	
Dogwood Lat. 3	No Spill		.50	.50	
Dogwood Lat. 4	No Spill		.45	.45	
Dogwood Lat. 5	Date Drain #3		.50	.50	
Dogwood Lat. 6	Mesquite 6 Drain	.95	2.30	3.25	
Dogwood Lat. 7	No Spill		.50	.50	
Dogwood Lat. 9	No Spill	.50		.50	
Dogwood Lat. 10	McCall Drain	.56	.94	1.50	
Dogwood Lat. 10A	No Spill	.50		.50	
Dogwood Lat. 11	No Spill	.50		.50	
Dogwood Lat. 13	Central Drain #5		.51	.51	
Redwood	Rose Outlet	7.36	5.07	12.43	4289
Redwood Lat. 1	No Spill		.79	.79	
Redwood Lat. 2	No Spill		.68	.68	
Redwood Lat. 3	No Spill	.50		.50	
Redwood Lat. 4	No Spill	.23		.23	
Redwood Lat. 5	Rose Drain #8	.78	2.22	3.00	
Redwood Lat. 5A	No Spill		.75	.75	
Redwood Lat. 6	No Spill	.25		.25	
Redwood Lat. 7	No Spill	1.00		1.00	
Redwood Lat. 8	Redwood 8 Drain	1.04	1.96	3.00	
Redwood Lat. 8A	No Spill		.50	.50	
Redwood Lat. 11	No Spill		.18	.18	
Rose	Lilac Drain	13.27	.08	13.35	3062
Rose Lat. 1	No Spill	1.25		1.25	
Rose Lat. 2	McCall 4 Drain	1.00		1.00	
Rose Lat. 3	Rose Drain #3-A	.26	1.99	2.25	
Rose Lat. 4	No Spill		.24	.24	
Rose Lat. 6	No Spill	.50		.50	
Rose Lat. 7	No Spill	.50	.50	1.00	
Rose Lat. 8	No Spill	.75		.75	
Rose Lat. 9	No Spill	.25		.25	
Roselle	Mesquite Drain	1.25		1.25	
Rubber	Rubber Drain and Mesquite Drain	5.23	2.02	7.25	
Rubber Lat. 1	No Spill		.50	.50	
Rubber Lat. 2	No Spill	1.00		1.00	
Rubber Lat. 3	No Spill	.50		.50	

HOLTVILLE DIVISION

Main Canals	Spills Into	Earth	Concrete	Total	Acreage
All American	Alamo River	63.42	2.60	66.02	
East Highline	No Spill	16.60		16.60	
Lateral Canals					
Ash Canal	Rositas Canal	2.62	10.38	13.00	
Ash Lat. 2	No Spill		.75	.75	
Ash Lat. 3	No Spill	.76	.24	1.00	
Ash Lat. 4	No Spill		.57	.57	
Ash Lat. 5	No Spill		.50	.50	
Ash Lat. 6	So. Central Drain #2		2.19	2.19	
Ash Lat. 8	No Spill		.55	.55	
Ash Lat. 9	So. Central Drain	.25	2.01	2.26	
Ash Lat. 11	No Spill		.05	.05	
Ash Lat. 12	No Spill		.66	.66	
Ash Lat. 13	Barbara Worth Drain	.76	.99	1.75	
Ash Lat. 15	Ash Lat. 30	2.30	6.45	8.75	
Ash Lat. 16	No Spill	.65		.65	
Ash Lat. 18	No Spill		.49	.49	
Ash Lat. 20	Ash 20 Drain	.80		.80	
Ash Lat. 25	Ash 25 Drain		1.77	1.77	
Ash Lat. 30	Rositas Canal	3.57	3.93	7.50	
Ash Lat. 32	No Spill		.24	.24	
Ash Lat. 33	Ash Lateral 15	.52	3.73	4.25	
Ash Lat. 34	Ash Lateral 30	.50	2.00	2.50	
Ash Lat. 35	No Spill		.25	.25	
Ash Lat. 36	No Spill		.50	.50	
Ash Lat. 37	So. Central Dr. #2-A		.68	.68	
Ash Lat. 38	No Spill		.50	.50	
Ash Lat. 39	No Spill	.50		.50	
Ash Lat. 40	No Spill		.49	.49	
Ash Lat. 41	Ash 30-A Drain		.50	.50	
Ash Lat. 42	No Spill		.50	.50	
Ash Lat. 43	Ash 30 Drain	.50		.50	
Ash Lat. 44	No Spill		.25	.25	
Ash Lat. 45	Barbara Worth Drain	.85	.25	1.10	
Ash Lat. 46	Rositas Canal		1.75	1.75	
EHL Lat. 1	EHL #6 Drain		5.43	5.43	
EHL Sidemain	No Spill	.40	2.99	3.39	
EHL Lat. 1A	No Spill		.49	.49	
EHL Lat. 1B	No Spill		.55	.55	
EHL Lat. 2	No Spill		.50	.50	
EHL Lat. 3	Verde Drain #2-B and Verde Drain #2-C		1.00	1.00	
EHL Lat. 4	Verde Drain #2-B and Verde Drain #2-C		1.82	1.82	
EHL Lat. 5	Verde Drain #2	1.25		1.25	
EHL Lat. 5B	Warren Dr. 2-C #1		1.00	1.00	

HOLTVILLE DIVISION (Con't.)

Lateral Canals	Spills Into	Earth	Concrete	Total	Acreage
EHL Lat. 6	No Spill		.50	.50	
EHL Lat. 7	Warren Drain	.25	4.93	5.18	
EHL Lat. 7A	No Spill		.32	.32	
EHL Lat. 8	Warren Drain #1		3.12	3.12	
EHL Lat. 10	Holtville Dr. #4		3.39	3.39	
EHL Lat. 11	EHL 11 Drain		3.29	3.29	
EHL Lat. 12	EHL 12 Drain		2.80	2.80	
EHL Lat. 13	Holtville Dr. #4		3.02	3.02	
EHL Lat. 14	EHL 14 Drain		3.00	3.00	
EHL Lat. 15	EHL 15 Drain		1.39	1.39	
EHL Lat. 16	No Spill		.60	.60	
Gunterman	No Spill	.29		.29	
Gunterman Lat. 1	No Spill	.20		.20	
Hemlock	Bonds Corner Dr.		6.93	6.93	
Hemlock Lat. 1	No Spill	.50		.50	
Hemlock Lat. 2	No Spill		.50	.50	
Hemlock Lat. 2B	Alamo River	2.07	.55	2.62	
Hemlock Lat. 2D	No Spill	.25		.25	
Hemlock Lat. 3	Bonds Corner Dr. #5		1.22	1.22	
Hemlock lat. 4	Alamo River	.23	.77	1.00	
Hemlock Lat. 5	No Spill		.50	.50	
Holt	Verde Drain		7.47	7.47	
Holt Lat. 1	No Spill		.08	.08	
Mesa Lat. 2	No Spill		.85	.85	
Mesa Lat. 3	EHL Lateral 1		4.22	4.22	
Mesa Lat. 3B	No Spill		.27	.27	
Mesa Lat. 3C	No Spill		.70	.70	
Mesa Lat. 3D	No Spill		.41	.41	
Mesa Lat. 3E	Mesa Drain		.26	.26	
Mesa Lat. 4	Mesa Drain		.16	.16	
Mesa Lat. 5	Mesa 6 Drain		.64	.64	
Oasis	Oasis Drain		8.97	8.97	3113
Oat	Oat Drain	1.51	7.49	9.00	2803
Occident	Occident Drain	4.24	4.76	9.00	2921
Orient	Orient Drain	1.50	7.50	9.00	3025
Palm	Palm Drain	1.05	7.20	8.25	
Palmetto	Palemetto Dr. and Rositas Canal	2.54	5.66	8.20	
Pampas	Pampas Drain	1.67	6.18	7.85	
Pansy	Township Dr #4		1.05	1.05	
Peach	Peach Drain	3.18	4.82	8.00	
Pear Side Main	Holtville #4 Dr. and Pear 2 Drain		3.87	3.87	
Pear	Rositas Supply Canal	4.83	7.67	12.50	
Pear Lat. 1	Palmetto Dr.	.52	1.23	1.75	
Pear Lat. 5	No Spill	.37		.37	
Pear 9th Street	Rositas Supply Canal	1.93	1.82	3.75	
Pear 10th St.	11th St. Ditch		1.25	1.25	
Pear 11th St.	9th St. Ditch	.52	1.85	2.37	

HOLTVILLE DIVISION (Con't.)

Lateral Canals	Spills Into	Earth	Concrete	Total	Acreage
Pear City Ditch	No Spill	.06	1.19	1.25	
Pepper	Pepper Drain	2.79	6.21	9.00	
Pepper Lat. 2	No Spill		.50	.50	
Pepper Lat. 3	No Spill		.50	.50	
Pepper Lat. 5	Township #2 Drain		.50	.50	
Pine	Pine Drain	2.93	5.32	8.25	
Plum	Plum Drain	.73	7.27	8.00	
Pomelo	Pomelo Drain	4.15	4.60	8.75	
South Alamo	Alamo River	6.32	5.34	11.66	4561
South Alamo Lat. 1	No Spill	.25		.25	
South Alamo Lat. 2	No Spill	.11	.55	.66	
South Alamo Lat. 3	No Spill	.25		.25	
South Alamo Lat. 4	No Spill	.31	.28	.59	
South Alamo Lat. 5A	No Spill	.50		.50	
South Alamo Lat. 6	No Spill		.75	.75	
South Alamo Lat. 10	Schenk 10 Drain		.50	.50	
South Alamo Lat. 11	Schenk 11 Drain		.24	.24	
South Alamo Lat. 12	No Spill		2.00	2.00	
South Alamo Lat. 16	No Spill		.34	.34	
South Alamo Lat. 17	No Spill	.12		.12	
South Alamo Lat. 18	No Spill	.25		.25	
Township	Township Drain	3.37	5.63	9.00	3178
Whitcomb	Bonds Corner Drain		2.33	2.33	
Whitcomb Lat. 1	No Spill		.25	.25	
Whitcomb Lat. 2	No Spill		.25	.25	
Yule	No Spill		.28	.28	

	Total No.	Total Miles
Laterals with Canal Spills	12	65.94
Laterals with Drain Spills	55	262.63
Laterals with No Spills	53	45.06
Total	120	373.63

BRAWLEY DIVISION

Main Canals	Spills Into	Earth	Concrete	Total	Acreage
Central Main	New River and Eucalyptus Canal	2.14		2.14	
East Highline	No Spill	10.80		10.80	
Lateral Canals					
Best	Best Drain	3.20	4.55	7.75	
Best Lat. 1	No Spill	.42		.42	
Bryant	No Spill	1.22	.25	1.47	
Lavender	Rose Outlet	4.07	1.43	5.50	
Lavender Lat. 1	No Spill		.31	.31	
Lavender Lat. 1A	No Spill	.60		.60	
Lilac	Lilac Drain	2.48	.47	2.95	
Magnolia	Magnolia Drain	1.56	6.44	8.00	3468
Malan	New River	.25	3.10	3.35	
Malva Lat. 1	Malva 1 Drain	.76	1.24	2.00	
Malva Lat. 2	Malva 2 Drain	5.47	2.73	8.20	
Malva Lat. 2A	No Spill		.10	.10	
Mansfield	Brawley Sewer	.90	1.60	2.50	
Maple	Maple Drain	4.08	3.62	7.70	2799
Marigold	Marigold Drain	4.99	3.96	8.95	
Mayflower	Mayflower Drain	3.26	5.39	8.65	
Mesquite	Mesquite Drain	4.12	3.78	7.90	2756
Moorhead	Alamo River	.10	6.13	6.23	
Moorhead Lat. 1	No Spill		.54	.54	
Moorhead Lat. 2	Alamo River		.43	.43	
Moorhead Lat. 3	Alamo River	.55		.55	
Moorhead Lat. 4	No Spill	.20		.20	
Moss	Moss Drain	3.57	4.53	8.10	2658
Mulberry	Mulberry Drain	4.77	3.63	8.40	
Mullen	Mullen Drain	6.09	2.01	8.10	2146
Munyon	Munyon Drain	4.53	3.27	7.80	
Myrtle	Myrtle Drain	2.03	5.77	7.80	
Oak	Oak Drain	2.99	5.81	8.80	1996
Oakley	Livesley Drain	.97	2.53	3.50	
Ohmar	Ohmar Drain	5.27	4.13	9.40	3078
Oleander	Oleander Drain	4.26	5.04	9.30	3166
Oleander Side Main	No Spill		.25	.25	
Olive	Olive Drain	2.22	2.53	4.75	1464
Orange	Orange Drain	5.02	4.48	9.50	3527
Orchid	Olive Drain	1.76	7.89	9.65	3259
Orita	Orita Drain	2.71	6.59	9.30	2745
Osage	Osage Drain	6.25	3.05	9.30	2211
Oxalis	Oxalis Drain	5.15	3.95	9.10	3115
Rockwood	Vail Canal	6.83	8.73	15.56	
Rockwood Lat. 1	No Spill		.50	.50	
Rockwood Lat. 2	No Spill	.38		.38	
Rockwood Lat. 3	No Spill		.50	.50	

BRAWLEY DIVISION (Con't.)

Lateral Canals	Spills Into	Earth	Concrete	Total	Acreage
Rockwood Lat. 4	No Spill		.98	.98	
Rockwood Lat. 5	Alamo River	1.50		1.50	
Rockwood Lat. 5A	Jones Drain		.45	.45	
Rockwood Lat. 6	No Spill		.50	.50	
Rockwood Lat. 7	Meserve Drain		.99	.99	
Rockwood Lat. 8	No Spill	.50		.50	
Standard	Standard Drain	5.11	3.34	8.45	
Stanley	Oakley Canal		2.50	2.50	
Stanley Lat. 1	New River		.25	.25	
Stanley Lat. 1A	No Spill	.25		.25	

	Total No.	Total Miles
Laterals with Canal Spills	3	19.13
Laterals with Drain Spills	36	216.17
Laterals with No Spills	16	18.30
Total	55	253.60

WESTMORLAND DIVISION

Main Canals	Spills Into	Earth	Concrete	Total	Acreage
Westside Main	Trifolium Storm Dr.	19.20		19.20	
Lateral Canals					
Barth	Trifolium 20-A Drain	.90		.90	
Marsh	No Spill		.49	.49	
Poe	Poe Drain	1.00		1.00	
Sandal	Main Spruce Canal		2.59	2.59	
Sandal Lat. 1	Main Spruce Canal		1.41	1.41	
Sandburg	No Spill		.25	.25	
Smilax	No Spill		1.23	1.23	
Smilax Lat. 1	Spruce Lat. 4		.99	.99	
New Spruce	Spruce Main Canal		3.51	3.51	
Spruce Main	New River	2.49	6.51	9.00	3773
Spruce Lat. 1	Spruce 1 Drain	.50	.75	1.25	
Spruce Lat. 3	Spruce 3 Drain		1.00	1.00	
Spruce Lat. 4	New River		4.01	4.01	
Spruce Lat. 5	Cole Drain		2.00	2.00	
Spruce Lat. 6	New River	1.75		1.75	
Sumac	Westside Main Canal	2.35	6.84	9.19	
Sumac Lat. 1	New River	.55	1.89	2.44	
Sumac Lat. 2	Cook Drain	.25	1.51	1.76	
Sumac Lat. 3	No Spill	.25		.25	
Sumac Lat. 4	No Spill		.49	.49	
Tamarack	Tamarack Drain	1.05	4.35	5.40	
Thistle	Westside Main Canal	3.28	6.72	10.00	
Thistle Lat. 2A	No Spill		.31	.31	
Thistle Lat. 3	No Spill		.35	.35	
Thistle Lat. 4	Westside Main Canal	.68	4.57	5.25	
Thistle Lat. 5	Westside Main Canal	1.73	2.77	4.50	
Thistle Lat. 7	Westside Main Canal	1.48	1.02	2.50	
Thistle Lat. 8	Westside Main Canal	.59	1.91	2.50	
Thorn	Westside Main Canal	1.73	3.27	5.00	
Thorn Lat. 1	Westside Main Canal	.50	4.25	4.75	
Thorn Lat. 1A	No Spill		.15	.15	
Timothy	Timothy 1 Drain		2.58	2.58	
Trifolium Ext.	No Spill	4.68	5.78	10.46	
Trif. Ext. Lat. 1	No Spill	.30		.30	
Trif. Ext. Lat. 2	Trifolium 22 Drain	1.29		1.29	
Trif. Ext. Lat. 2A	No Spill	.28		.28	
Trif. Ext. Lat. 7	San Felipe Wash		2.43	2.43	
Trif. Ext. Lat. 7A	No Spill		2.12	2.12	
Trif. Ext. Lat. 8	San Felipe Wash		2.22	2.22	
Trif. Ext. Lat. 9	Trifolium 23 Drain		.72	.72	
Trif. Lat. 1	No Spill		.49	.49	
Trif. Lat. 2	Timothy 2 Drain	1.14	4.01	5.15	
Trif. Lat. 3	Trifolium 3 Drain	3.14	2.11	5.25	
Trif. Lat. 4	Trifolium 4 Drain		4.72	4.72	

WESTMORLAND DIVISION (Con't.)

Lateral Canals	Spills Into	Earth	Concrete	Total	Acreage
Trif. Lat. 4A	Trifolium 6 Drain	1.00		1.00	
Trif. Lat. 5 North	Trifolium 6 Drain		2.67	2.67	
Trif. Lat. 5 South	Trifolium 4A Canal	.76	1.89	2.65	
Trif. Lat. 6	New River	.40	5.18	5.58	
Trif. Lat. 7	New River	1.92	3.98	5.90	
Trif. Lat. 8	Trifolium 8 Drain	.63	5.62	6.25	1601
Trif. Lat. 9	Trifolium 9 Drain		6.50	6.50	
Trif. Lat. 10	Trifolium 10 Drain	.49	5.66	6.15	1926
Trif. Lat. 11	Trifolium 11 Drain	.97	5.28	6.25	
Trif. Lat. 12	Trifolium 12 Drain	2.02	3.73	5.75	
Trif. Lat. 13	Salton Sea	4.49	1.63	6.12	2716
Trif. Lat. 13A	No Spill		.47	.47	
Trif. Lat. 13B	No Spill		.51	.51	
Trif. Lat. 14	Trifolium 14 Drain	1.15		1.15	
Trif. Lat. 15	Trifolium 15 Drain	1.25		1.25	
Trif. Lat. 16	Trifolium 1 Drain	.78	1.22	2.00	
Tuberose	Westside Main Canal	2.12	2.13	4.25	
Turnip	Westside Main Canal		3.70	3.70	
Westmorland	Westside Main Canal		3.51	3.51	

	Total No.	Total Miles
Laterals with Canal Spills	16	66.30
Laterals with Drain Spills	33	130.64
Laterals with No Spills	15	18.15
Total	64	215.09

CALIPATRIA DIVISION

Main Canals	Spills Into	Earth	Concrete	Total	Acreage
East Highline	"Z" Drain	17.69		17.69	
Vail	Vail Main Drain	13.26	4.59	17.85	
"Z" Waste	Salton Sea	5.00		5.00	
Lateral Canals					
"B"	"B" Drain	4.70	5.45	10.15	
"C" East	"C" Drain	6.12	2.18	8.30	
"C" West	"D" West Canal	.77	2.33	3.10	
"C" Lat. 1	Alamo River	.30	1.00	1.30	
"D" East	"D" Drain	4.84	2.16	7.00	
"D" West	"D" Drain		2.50	2.50	
"E"	"E" Drain	7.31	3.49	10.80	
"F"	"F" Drain	7.40	3.00	10.40	
"G"	"G" Drain	7.68	2.52	10.20	
"G" Lat. 1	"G" Canal	.30		.30	
"G" Lat. 2	No Spill		.50	.50	
"H"	"H" Drain	4.68	4.82	9.50	
"I"	"I" Drain	3.39	6.01	9.40	
"J"	"J" Drain	7.99	1.01	9.00	
"K"	"K" Drain	5.55	.63	6.18	
"L"	"L" Drain	5.21	2.99	8.20	
"M"	"M" Drain	3.22	3.98	7.20	
"N"	"N" Drain	4.16	4.04	8.20	
Narcissus	Narcissus Drain	4.47	4.93	9.40	
Nectarine	Vail Supply Canal	1.96	.84	2.80	
Nectarine "A"	Vail Supply Canal		4.50	4.50	
Nettle	Nettle Drain	3.28	6.02	9.30	
Niland Ext.	No Spill	4.11		4.11	
Niland Lat. 1	Niland 1 Drain	2.90		2.90	
Niland Lat. 2	Niland 2 Drain	2.20		2.20	
Niland Lat. 3	Niland 3 Drain	2.85		2.85	
Niland Lat. 4	Niland 4 Drain	2.00		2.00	
Niland Lat. 5	Salton Sea	2.35		2.35	
Niland Lat. 6	No Spill	.40		.40	
Nutmeg	Vail Supply Canal	4.47	5.83	10.30	
"O"	"O" Drain	5.63	1.77	7.40	
O'Brien	New River	.40	1.98	2.38	
"P"	"P" Drain	7.50		7.50	2204
"Q"	"Q" Drain	5.64	1.16	6.80	2017
"R"	"R" Drain	5.74	.16	5.90	1656
"R" Side Main	No Spill	1.60		1.60	
"S"	"S" Drain	5.50		5.50	
"T"	"T" Drain	5.22		5.22	
"U"	"U" Drain	2.95	.05	3.00	
Vail Lat. 1	Alamo River	.71	3.49	4.20	
Vail Lat. 2	Alamo River		5.02	5.02	
Vail Lat. 2A	Alamo River	1.91	4.34	6.25	
Vail Lat. 3	Pumice Drain	2.47	4.03	6.50	1933

CALIPATRIA DIVISION (Con't.)

Lateral Canals	Spills Into	Earth	Concrete	Total	Acreage
Vail Lat. 3A	Vail 3-A Drain	4.48	1.52	6.00	
Vail Lat. 4	Pumice Drain	4.47	1.53	6.00	1840
Vail Lat. 4A	Salton Sea	3.31	.99	4.30	882
Vail Lat. 5	Salton Sea	2.99	2.51	5.50	1162
Vail Lat. 5A	Salton Sea & Vail Cut-Off Drain		2.99	2.99	
Vail Lat. 6	Salton Sea	4.75		4.75	280
Vail Lat. 6A	No Spill		.50	.50	
Vail Lat. 6B	No Spill		.50	.50	
Vail Lat. 6C	No Spill		.52	.52	
Vail Lat. 7	Salton Sea	1.78	1.50	3.28	
"W"	"W" Drain	3.00		3.00	
"X"	"W" Drain #1A	.04	.96	1.00	
"Y"	"W" Drain	4.10		4.10	
"Z"	"Z" Waste		1.75	1.75	

	Total No.	Total Miles
Laterals with Canal Spills	5	21.00
Laterals with Drain Spills	49	298.21
Laterals with No Spills	7	8.13
Total	61	327.34

APPENDIX B

CANALS TO BE CONCRETE LINED DUE TO HIGH SEEPAGE

BRAWLEY DIVISION

CANAL	LOCATION	MILES
Best	Heading to delivery 46	0.25
	Dogwood Rd. to delivery 48	0.50
	Delivery 110 to delivery 120	1.75
Bryant	Heading to Stanley Heading	1.14
Malva Lateral 1	Heading to delivery 2	0.75
Mansfield	Delivery 19 to existing pipeline	0.65
Mesquite	Delivery 5 to delivery 7	1.00
Myrtle	Heading to delivery 3	0.75
Ohmar	Delivery 2 to delivery 4	0.50
Orange	Heading to delivery 4	1.10
Orita	1/4 mile east del. 1 to del. 2-A	1.00
	Delivery 7 to delivery 21	1.00
Osage	Heading to delivery 7	3.00
Oxalis	Heading to delivery 5	1.70
Rockwood	Delivery 133 to delivery 138	1.50
	Delivery 167 to delivery 172	2.00
	TOTAL MILES	18.59

CANALS TO BE CONCRETE LINED DUE TO EXCESSIVE SEEPAGE

CALIPATRIA DIVISION

CANAL	LOCATION	MILES
"B" Lateral	Delivery 9 to delivery 11	0.50
	SPRR to delivery 42	1.10
"C" West	Heading to delivery 38	0.50
"E" Lateral	Delivery 24 to delivery 41	3.00
"F" Lateral	Delivery 24 to delivery 31-A	1.50
"G" Lateral	Delivery 10 to delivery 14	1.00
	Delivery 24 to Highway 111	2.50
"H" Lateral	Delivery 24 to SPRR	0.80
"J" Lateral	Delivery 18 to delivery 32	0.50
"K" Lateral	Delivery 10 to SPRR	3.50
"L" Lateral	Delivery 24 to delivery 31	2.00
Nettle	Delivery 3 to delivery 4	0.50
Nutmeg	Delivery 8 to delivery 9	0.75
Vail Main	Lat. 4 Hdg. to Lat. 6 Hdg.	2.00
Vail Lateral 2-A	Delivery 256 to delivery 257	0.25
Vail Lateral 3	Delivery 307 to delivery 309	0.50
Vail Lateral 3-A	Delivery 355 to delivery 357	0.50
	Delivery 364 to delivery 365	0.25
Vail Lateral 5	Delivery 505 to delivery 507	0.50
	TOTAL MILES	22.15

CANALS TO BE CONCRETE LINED DUE TO HIGH SEEPAGE

EL CENTRO-CALEXICO DIVISION

CANAL	LOCATION	MILES
Acacia	Delivery 62 to delivery 68	1.00
Alamitos	Lat. 8 Hdg. to delivery 54	2.50
Alder	Heading to Alder Lat. 2	2.00
Dogwood	Delivery 1 to delivery 34	1.00
Rose	Delivery 4 to delivery 6	1.00
Wistaria	Delivery 48 to 1/2 mile north	0.50
	Lateral 4 Hdg. to delivery 110	3.00
Wormwood	Heading to delivery 9	1.00
	Delivery 52 to delivery 65	1.25
Wormwood Lateral 7	Delivery 103 to end	2.00
	TOTAL MILES	15.25

CANALS TO BE CONCRETE LINED DUE TO HIGH SEEPAGE

HOLTVILLE DIVISION

CANAL	LOCATION	MILES
Ash Main	Heading to Lat. 2	1.00
Ash Lateral 15	Heading to delivery 107	2.00
Ash Lateral 30	Delivery 172 to delivery 173	0.50
Ash Lateral 33	Delivery 152 to delivery 152-A	0.25
	Delivery 165 to delivery 167	0.25
Orient	Delivery 2 to delivery 2-A	0.25
Palm	Heading to delivery 2	0.10
	Delivery 6 to delivery 7	0.25
	1/4 mile E. del. 8 to Holtville Mn. Dr.	0.60
Palmetto	Pampas Dr. #1 to delivery 5	0.25
Pampas	Heading to delivery 4	0.75
	Delivery 10 to delivery 12	0.60
	Delivery 23-A to delivery 24	0.25
Pear Main	Delivery 29 to delivery 30	0.75
	Delivery 33 to delivery 45	0.25
Pear Lateral 1	Delivery 43 to delivery 44	0.50
Peach	Delivery 2 to delivery 6	1.50
	Delivery 30 to delivery 34	1.25
Pepper	Heading to delivery 1	0.20
	Delivery 3-A to delivery 4	0.25
Pine	Heading to delivery 4	0.60
Pomelo	Delivery 34 to delivery 37	0.75
South Alamo	Heading to Heber Road	5.50
	Delivery 117 to delivery 119	0.25
Township	Delivery 4 to delivery 6	1.00
	TOTAL MILES	19.85

CANALS TO BE CONCRETE LINED DUE TO HIGH SEEPAGE

WESTMORLAND DIVISION

CANAL	LOCATION	MILES
Main Spruce	Heading to Brandt Road	1.00
	Delivery 31 to delivery 34-A	1.00
Sumac	Delivery 46 to Sumac Lat. 4	0.83
Sumac Lateral 1	Heading to delivery 13	0.75
Thistle Main	Heading to delivery 6	1.25
	Delivery 36 to delivery 38	0.50
Thistle Lateral 5	Delivery 13 to delivery 18	1.00
Thistle Lateral 7	Delivery 6 to delivery 13	1.00
Thorn	Heading to delivery 7	1.20
	Delivery 20 to delivery 25	0.50
Thorn No. 1	Delivery 119 to delivery 120	0.25
Trifolium Lateral 2	Heading to delivery 22	0.50
Trifolium Lateral 3	Delivery 45 to delivery 50	1.50
Trifolium Lateral 7	Delivery 135 to delivery 137	1.00
Trifolium Lateral 12	Heading to Baughman Road	1.00
Trifolium Lateral 13	1/2 mile so. del. 250 to del. 253	1.00
Trifolium Lateral 14	Heading to delivery 265	0.50
Trifolium Lateral 15	Delivery 284 to delivery 287	0.75
Trifolium Extension	Heading to delivery 8	1.35
	Poe Heading to Trif. Ext. Lat. 2	2.50
Tuberose	Delivery 140 to delivery 143	1.00
	TOTAL MILES	20.38

CANALS TO BE CONCRETE LINED DUE TO HIGH SEEPAGE

IMPERIAL DIVISION

CANAL	LOCATION	MILES
Date	Heading to delivery 36	1.50
Date Lateral 4	Heading to end	0.25
Date Lateral 5	Heading to end	0.50
Date Lateral 10	Heading to end	1.50
Dahlia	Delivery 52 to delivery 70	1.10
Dahlia Lateral 8	Heading to delivery 55	1.00
Dandelion	Delivery 2 to end	3.50
Elder	Heading to delivery 4-A	0.70
	Lat. 5 Hdg. to delivery 69	2.00
Eucalyptus	Heading to delivery 8	1.50
	Delivery 74 to delivery 75	0.50
	Delivery 106 to delivery 113	1.50
	Delivery 144 to delivery 148	1.00
	1/2 mile so. del. 151 to del. 151	0.50
Eucalyptus Lateral 14	Heading to delivery 114-A	1.25
Fern Side Main	Heading to end	0.50
Fillaree	Heading to delivery 12	3.50
Newside	Delivery 23 to delivery 42	3.00
	TOTAL MILES	25.30

APPENDIX C

RESOLUTION NO. 51-84

WHEREAS, the Board of Directors of Imperial Irrigation District has heretofore adopted Rules and Regulations Governing the Distribution and Use of Water pursuant to Section 22257 of the Water Code of the State of California; and

WHEREAS, Regulation No. 39 of said regulations pertains to surface drain farm outlets; and

WHEREAS, a public hearing was held on September 20, 1984, for the purpose of receiving public comments on (1) Installing recorders on all delivery gates and tailwater structures, and (2) initiating a voluntary tailwater recovery program; and

WHEREAS, in order to install recorders and obtain reasonably accurate measurements, tailwater structures need to be properly constructed and maintained;

NOW THEREFORE, on motion of Director Edwards, seconded by Director Benson, BE IT HEREBY RESOLVED that Regulation No. 39 of the "Rules and Regulations Governing the Distribution and Use of Water and Construction, Operation and Maintenance of the Canal and Drainage System of Imperial Irrigation District" shall be amended and revised to read in its entirety in accordance with Exhibit A attached hereto and made a part hereof.

PASSED AND ADOPTED THIS 6th day of November, 1984.

IMPERIAL IRRIGATION DISTRICT

By _____
President

By _____
Secretary

IMPERIAL IRRIGATION DISTRICT
ORGANIZED
JULY 25, 1911
EL CENTRO, CALIFORNIA

IMPERIAL IRRIGATION DISTRICT

EXHIBIT "A"

REGULATION 39 - Agricultural Tailwater Structures

A. PURPOSE:

It is the intent of this regulation to provide an I.I.D. standard tailwater structure to serve primarily as a drainage structure while at the same time to facilitate the reasonably accurate measurement of the drainage discharge from each farmed unit.

B. LOCATION AND NUMBER ALLOWED:

1. Number Allowed

Each farmed unit is entitled to one tailwater structure provided the District maintains facilities to accept the discharged water and there is no conflict with other portions of this regulation.

2. Location of Tailwater Structures

Tailwater structures normally will be at intervals of not less than .25 mile, except where required by property lines of individual holdings.

C. STANDARD STRUCTURE:

1. Structure

All tailwater structures installed or replaced after December 1, 1984, must be certified by District to conform to size, length, depth, elevation of grade board, etc. as shown on IID Dwg. #12F-6855 "Standard Tailwater Structure Installation."

2. Approach Channel

An approach channel will be maintained perpendicular to face of tailwater structure, free of vegetation and debris. The maintained approach channel shall be a minimum of 10 feet in length from the face of the tailwater structure and the minimum bottom width shall be 24 inches.

D. ADDITIONAL FIELD STRUCTURES:

The water user may see it necessary to install additional field structures such as those to provide water elevation or trash control. Structures of this type may be installed no closer than five feet upstream of the certified standard structure.

E. LANDOWNER'S RESPONSIBILITY

1. Installing New Tailwater Structures

a. Construction of New I.I.D. Drains

The landowner will deposit with the District, prior to construction, the cost of material for a tailwater structure to be installed during construction of a new drain.

b. Existing I.I.D. Drains

If the landowner requests a new tailwater structure to discharge into an existing I.I.D. Drain, he will deposit with the District, in advance, the cost of material and installation.

2. Replacing Existing Tailwater Structures

a. Damaged Tailwater Structures

The landowner will be responsible for all costs in connection with replacing tailwater structures damaged, washed out or otherwise defective, caused in whole or in part by landowner's use and/or operations.

The landowner will be responsible for material cost when replacing existing tailwater structures only when it becomes necessary due to pipe deterioration or failure that is not caused by abuse of the water user.

b. Reconstruction and/or Deepening of Existing I.I.D. Drains

If the reconstruction and/or deepening of an existing I.I.D. drain necessitates the replacement of a tailwater structure which is not standard, the landowner will be required to deposit the cost of material required to replace the existing tailwater structure.

3. Maintenance

It is the responsibility of each water user to maintain a tailwater structure and approach channel in acceptable condition, in order to qualify for delivery of water. An acceptable structure shall have vertical walls and a permanent, level grade board set a maximum of 12 inches below the natural surface. If the situation warrants, and at the discretion of the District, 18 inches maximum may be allowed.

F. I.I.D. RESPONSIBILITY

1. Installing New Tailwater Structures

a. Construction of New I.I.D. Drains

The District will be responsible for installation costs of tailwater structures discharging into new drains.

b. Existing I.I.D. Drains

The District shall install tailwater structures discharging into existing I.I.D. drains, provided the landowner deposits an amount equal to material and installation costs.

2. Replacing Existing Tailwater Structures

a. Damaged Tailwater Structures

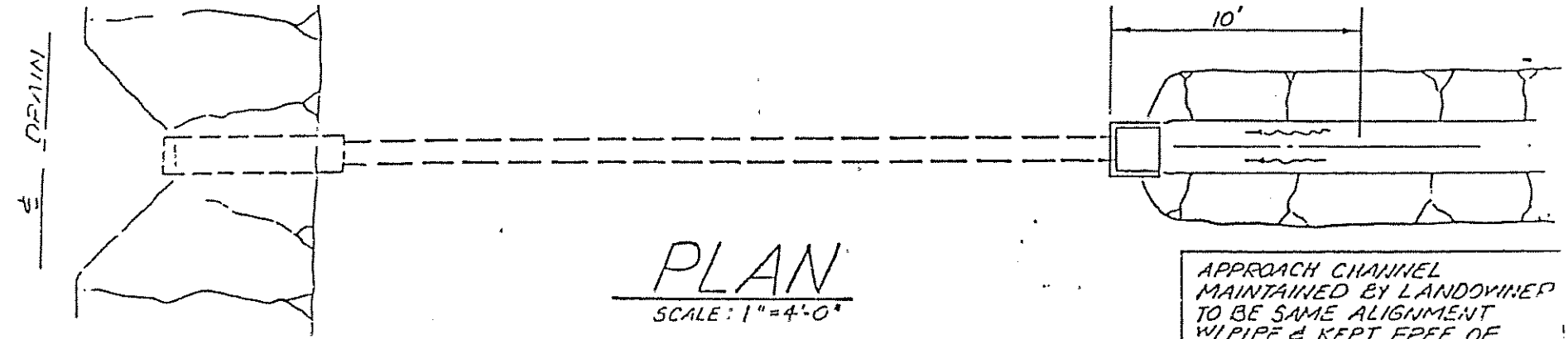
The District shall be responsible for installation cost when replacing existing tailwater structures only when it becomes necessary due to pipe deterioration or failure, that is not caused by abuse by the water user.

b. Reconstruction and/or Deepening of Existing I.I.D. Drains

In the case of reconstruction and/or deepening of existing I.I.D. drains, the District shall replace all existing standard tailwater structures.

3. Maintenance

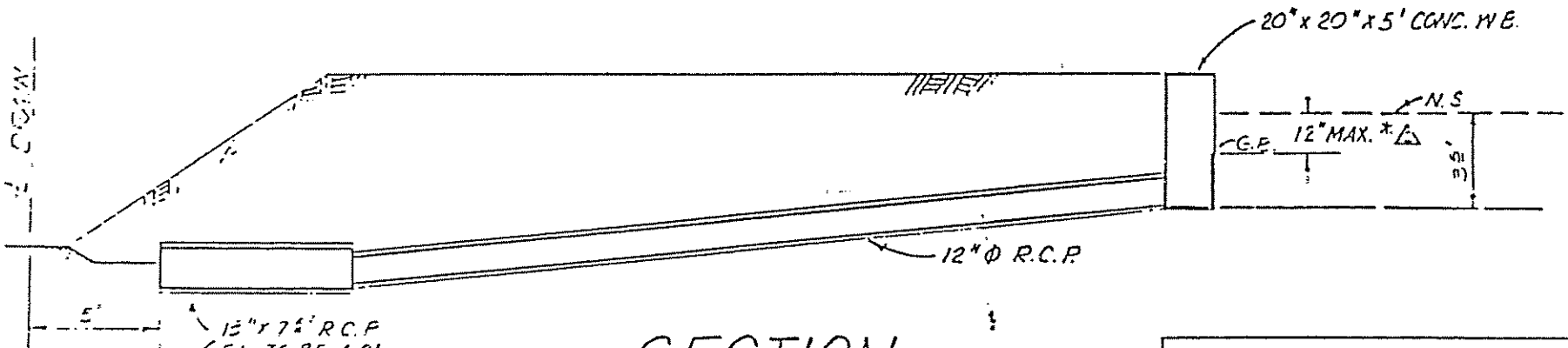
The District shall assume responsibility for normal drain maintenance. However, cleaning of drains caused by washouts due to the landowner's operations will be at the landowner's expense.



PLAN

SCALE : 1"=4'-0"

APPROACH CHANNEL MAINTAINED BY LANDOWNER TO BE SAME ALIGNMENT W/ PIPE & KEPT FREE OF VEGETATION & DEBRIS



SECTION

SCALE : 1"=4'-0"

* IF THE SITUATION WARRANTS, A. AT THE DISCRETION OF THE DISTRICT, 18" MAX. MAY BE ALLOWED

B.M.	ISSUE 4		T.	S.	FIELD BOOK
	ISSUE 3				FIELD BY DATE
Elev. F.B.	ISSUE 2	REVISED 10-25-84 D.D.	R.	E.	DRAWN BY D.D. DATE 7-12-84
	ISSUE 1	7-12-84 D.D.			CHECKED BY
					APPROVED BY DATE:

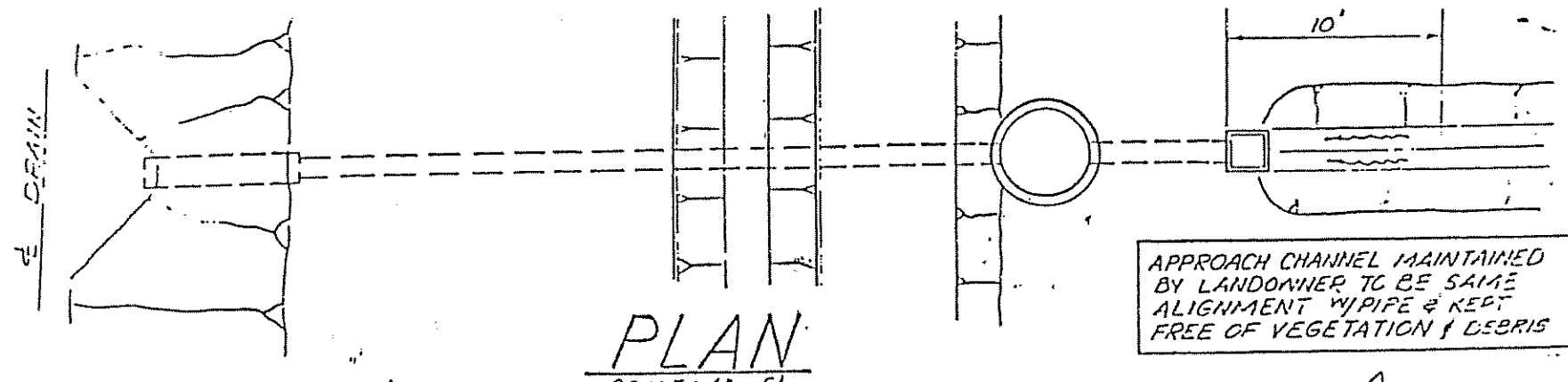
IMPERIAL IRRIGATION DISTRICT
ENGINEERING DEPARTMENT
IMPERIAL, CALIFORNIA

STANDARD TAILWATER STRUCTURE

FOR OUTLET INTO DRAIN

SH. 1 OF 2 DWG NO 12E-682

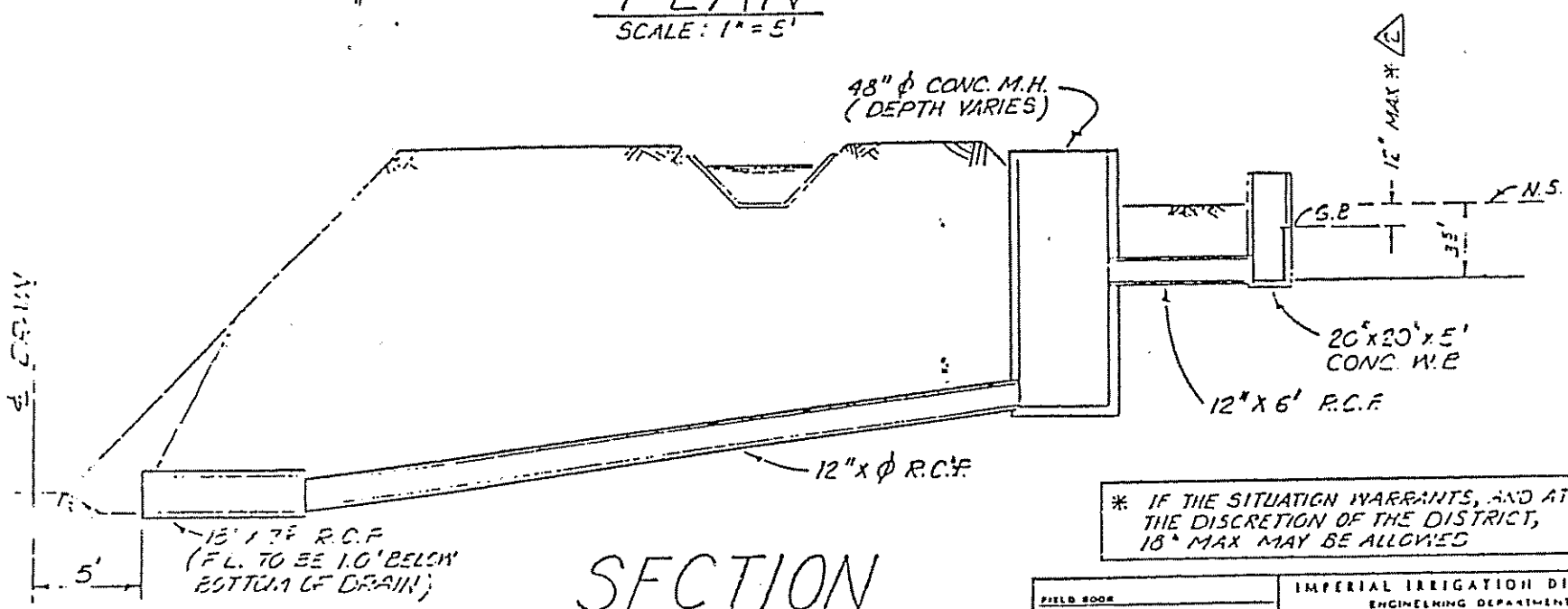
Exhibit 5
Sheet 2



PLAN

SCALE : 1" = 5'

APPROACH CHANNEL MAINTAINED BY LANDOWNER TO BE SAME ALIGNMENT W/PIPE & KEPT FREE OF VEGETATION & DEBRIS



SECTION

SCALE : 1" = 5'

* IF THE SITUATION WARRANTS, AND AT THE DISCRETION OF THE DISTRICT, 18" MAX MAY BE ALLOWED

FIELD BOOK		IMPERIAL IRRIGATION DISTRICT	
FIELD BY DATE		ENGINEERING DEPARTMENT	
DRAWN BY D.D DATE 7-12-84		IMPERIAL, CALIFORNIA	
CHECKED BY		STANDARD T-WALL-ITEM STRUCTURE	
APPROVED BY		W/OUTLET INTO OTHER STRUCTURES	
DEPR.			

B.M.	ISSUE 4		T.	S.
	ISSUE 3			
Elev. F.B.	ISSUE 2	REVISED 10-29-84 D.D	R.	E.
	ISSUE 1	7-12-84 DD		

SH. 2 OF 2 DWG NO 12F-6[illegible]

Exhibit
Sheet

APPENDIX D

UNITED STATES DEPARTMENT OF AGRICULTURE

AGREEMENT FACE SHEET

AGENCY (Name & address)

AGRICULTURAL RESEARCH SERVICE
WESTERN REGION
1333 Broadway, Suite 400
Oakland, CA 94612

AGREEMENT NO.: N/A

PROPOSAL NO.: N/A

PERIOD OF AGREEMENT
From: November 1, 1981 Thru: February 1, 1986

AMOUNT

☐ Increase	Previous Total	$ N/A
☐ Decrease	+ or −	$ N/A
☒ New	New Total	$ N/A

PERFORMING ORGANIZATION (Cooperator, Grantee, Contractor) (Name & address)

IMPERIAL IRRIGATION DISTRICT
333 E. Main Imperial
Imperial, CA 92251

TYPE OF ACTION (e.g., new, change, amendment, etc.): New

ADVANCE PAYMENT: $ N/A

OBLIGATION DISTRIBUTION

Accounting Code No.	Amount
N/A	$ N/A

TITLE OF PROJECT

Use of saline drainage water for irrigation: a field demonstration in the Imperial Valley

INFORMATION SYSTEM NO.: CRIS W/U No. 5210-20730-002

PRINCIPAL INVESTIGATOR, PROJECT DIRECTOR, OR REPRESENTATIVE (Name & address)

Mr. D. A. Twogood, Represenative
(same address as above)

TYPE OF AGREEMENT: MEMORANDUM OF UNDERSTANDING - INDIVIDUAL

AUTHORITY: 7 USC 427, 427(i), 450a, 1624 and 2201

PROVISIONS

This Agreement includes the following attachments:

- ☐ Statement of Work; or
- ☐ Project Summary; and
- ☐ General Provisions
- ☐ Special Provisions
- ☐ Budget
- ☐ Proposal
- ☒ Other (specify): EXHIBIT "A" "Patent Provisions"

FOR THE UNITED STATES DEPARTMENT OF AGRICULTURE

Signature indicates a grant award when a grant authority is cited above.

TYPED NAME	SIGNATURE	DATE
Authorized Departmental Officer		

THE AUTHORIZED DEPARTMENTAL OFFICER'S DESIGNATED REPRESENTATIVE (ADODR) (Name)

Dr. James D. Rhoades

ADDRESS

USDA-ARS-Western Region
U. S. Salinity Laboratory
4500 Glenwood Drive
Riverside, CA 92501 (714-683-0170)

FOR THE PERFORMING ORGANIZATION

(Signature of person authorized by the governing body of the performing organization to incur contractual obligations.)

Signature indicates acceptance of grant when a grant authority is cited above.

TYPED NAME AND TITLE	SIGNATURE	DATE
Gerald L. Moore, President	[signature]	2-16-82
Larry E. Beck, Secretary	Larry E. Beck	2-16-82

FORM AD-351 (Mar 80)

THIS MEMORANDUM OF UNDERSTANDING is entered into between the United States Department of Agriculture, Agricultural Research Service, hereinafter referred to as ARS, and the Imperial Irrigation District, hereinafter referred to as the Cooperator, to support the research investigations on water conservation;

WHEREAS, it is the intention of the parties to this memorandum of understanding that such research investigations shall be for their mutual benefit and for the benefit of the people of the United States;

NOW, THEREFORE, for and in consideration of the promises and mutual covenants herein contained, the parties hereto do mutually agree with each other as follows:

A. The Cooperator Agrees:

1. To purchase, install and maintain equipment and provide the energy required to deliver Alamo River water on demand to a point adjacent to Ohmar lateral outlet number 30a in tract 126 at a rate of at least 6 cubic feet per second (CFS) from the Alamo River upstream of the point where the drainage canal that parallels Ohmar lateral discharges into the Alamo River.

2. To provide equipment, materials and services in addition to that described in paragraph 1 above, as requested by ARS and mutually agreed to, in order to facilitate the operations of the research.

3. To permit ARS to install flow measuring devices in the water delivery system and collect water samples as may be required in the research program.

4. To permit use of Alamo River water upon demand, to the experimental field, as requested by ARS, from February 1, 1982 until February 1, 1986.

5. To complete the installations necessary to deliver Alamo River water to the project field by February 1, 1982.

B. The Agricultural Research Service Agrees:

1. To operate the Alamo River water delivery system as required to meet the irrigation needs of the experiment in an orderly and careful manner to avoid damage or excessive wear on the equipment.

2. To irrigate the experimental sites using the Alamo River water to grow crops in two rotations: (1) wheat, sugarbeets, lettuce, wheat, sugarbeets, lettuce; and (2) cotton, cotton, wheat, and alfalfa.

3. To furnish the Cooperator annual progress reports and copies of research data as requested.

4. To the extent permitted by law, ARS will assume liability for damage to the property of the Cooperator at the research site caused by any negligent or wrongful act on the part of any ARS employee or agent.

5. To reimburse the Cooperator for any expenditures made by the Cooperator for materials or services requested by ARS and agreed to by the Cooperator that are in excess of $60,000 which the Cooperator plans to expend for the

materials and services set forth in paragraph A.1 and 2 herein for support of the research project. Such expenses exceeding $60,000 will be reimbursed under the Broad Form Cooperative Agreement No. 58-9AHZ-2-637 between ARS and the Cooperator.

C. It is Mutually Understood and Agreed:

1. Either party shall be free to furnish such equipment as may be needed or otherwise unavailable. Equipment furnished from Federal funds shall remain the property of the Federal Government, subhect to removal or other disposition at any time. Equipment purchased by the Cooperator shall remain the property of the Cooperator, subject to removal or other disposition at any time.

2. Results of the research herein outlined may be published jointly by the Cooperator and ARS, or by either of these institutions separately, but manuscripts prepared for publication by either shall be submitted to the other party for suggestions and approval prior to publication. In the event of any disagreement, either party may publish results on its own responsibility, giving proper acknowledgment of cooperation.

3. This Memorandum of Understanding is to define in general terms the basis on which the parties concerned will cooperate, and does not constitute a financial obligation to serve as a basis for expenditures. Each party will handle and expend its own funds. Any and all expenditures from Federal funds made in conformity with the plans outlined in this Memorandum of Understanding must be in accordance with the Department rules and regulations and in each instance based upon appropriate financial documents. The responsibilities assumed by the cooperating parties are contingent upon funds being made available from which expenditures may legally be made.

4. Funds of a cooperating party shall not be expended by a Federal employee. When the cooperating party has no representatives stationed in the locality, a Federal employee may handle the accounts, but shall forward the vouchers to the authorized agent of the cooperating party for payment. Cooperating parties should not send checks payable to Federal employees or send checks payable to "Cash" or "Bearer" for payments of local expenses.

5. Patent provisions applicable to this memorandum shall be in accordance with EXHIBIT "A", attached hereto and made a part hereof.

6. No member of, or delegate to Congress, or resident Commissioner, shall be admitted to any share or part of this memorandum or to any benefit that may arise therefrom, unless it be made with a corporation for its general benefit.

7. This Memorandum of Understanding became effective November 1, 1981, and shall continue until February 1, 1986, but may be modified or discontinued at the request of either party. Requests for termination or any major change shall be submitted to the other party for consideration not less than 60 days in advance of the effective date desired.

APPENDIX E

DEFINITIONS

When discussing water conservation, especially relating to irrigated agriculture, it is necessary to clarify certain terms. Listed in this chapter are many definitions used in this Water Conservation Plan. Some definitions have been taken from USBR and DWR sources. Terms not listed are defined in "Proposed Water Operation and Maintenance Bulletin" published by the USBR.

Acre-Foot: A measure of the volume (such as irrigation water) that would cover one acre to a depth of one foot.

Applied Water: Water delivered to a user. Also called delivered water. Applied water may be used for either inside uses or for outside watering. It does not include precipitation or distribution losses. It may apply to metered or unmetered deliveries.

Bureau: United States Bureau of Reclamation

Consumptive Use: Total amount of water used for evapotranspiration and building plant tissue.

Conveyance System Efficiency: The ratio of the volume of water delivered to users to the volume of water introduced into the conveyance system. The conveyance system for the Imperial Irrigation District service area starts at Drop 1 on the All-American Canal.

Crop Rotation: The practice of growing different crops in succession on the same land chiefly to preserve the productive power of the soil.

Cropping Pattern: The acreage distribution of different crops in any one year in a given farming area, such as a county, water agency, or farm. Thus, a change in cropping pattern from one year to the next can occur by changing the relative acreage of existing crops, and/or by introducing new crops, and/or cropping some existing crops.

Crop Coefficient: A coefficient that relates ET of a given crop at a specific time in its growth stage to a reference ET condition. This coefficient incorporates effects of crop growth state, crop density, and other cultural factors effecting ET.

Crop Water Requirement: Crop consumptive use plus the water required to provide the leaching requirements.

Deep Percolation: The movement of water by gravity downward through the soil profile beyond the root zone; hence, this water is unused by plants.

Demand Scheduling: Delivery of water to the user by a water agency whenever the user demands it, subject to agency regulations on prior notice of demand and on quantity availability. Scheduling is, therefore, flexible and more convenient to the user than the supplier.

District: Imperial Irrigation District.

District Irrigation Efficiency: The ratio of the volume of water delivered to users to the volume of water delivered to the irrigation district service area conveyance system at Drop No. 1.

Drop No. 1: The initial drop structure located on the All-American Canal; considered as the head of the IID conveyance system.

Double Cropping: Growing two or more crops on the same field at different times of the year.

DWR: California Department of Water Resources.

Evapotranspiration (ET): The quantity of water transpired by plants or evaporated from adjacent soil surfaces in a specific time period. Usually expressed in depth of water per unit area.

Growing Season: The time period during which it is warm enough for plants to transpire and grow.

Irrecoverable Water: That portion of delivered water degraded physically or chemically to a level that makes it uneconomical to reclaim, and water discharged directly to the ocean or other land or water body where the water is no longer recoverable.

Infiltration Rate: The rate of penetration of water through the soil profile; typically expressed as inches of water per hour.

Leaching Requirement: The unit amount of water required to dissolve and transport enough salts through the soil profile to maintain a salt balance favorable to economic plant growth. The leaching requirement depends on crop tolerance and water quality.

Lysimeter: A device such as a tank or large barrel containing a mass of soil, usually planted to some vegetation, which is isolated hydrologically from its surroundings. The device commonly used in research to determine the ET rate of various crops.

On-Farm Irrigation Efficiency: The ratio of the volume of water used for consumptive use and leaching requirements in cropped areas to the volume of water delivered to farm (applied water).

On-Farm System: The method used to distribute and apply the water to fields. Included are gravity or surface systems and pressurized systems such as sprinklers or drip. Tailwater disposal or recovery systems are included.

Precipitation: The total measurable supply of water of all forms of falling moisture, including dew, rain, mist, snow, hail, and sleet; usually expressed as depth of liquid water on a horizontal surface on a daily, monthly, or yearly basis.

Pump-back System: A return flow system in which tailwater is pumped back to head of irrigation ditch for reuse.

Return Flow: That portion of the water diverted for irrigation that returns to ground water or stream system for potential rediversion or instream uses.

Return Flow System: A system that recycles runoff water by either pumping it back to the supply or using it sequentially on a lower field. (Often a reservoir is required to enable flexible operation and to save labor).

Reused Water: Water used beneficially more than once.

Rotation Scheduling: Delivery of water to the user by a water agency usually on the basis of fixed amounts of water at fixed intervals. Scheduling is, therefore, somewhat rigid and more convenient to the supplier than the user.

Runoff: The water that leaves an area or field as surface flow.

Seepage: Downward or lateral movement of water through a pervious or semi-pervious bottom or wall of a container such as a pond or canal.

Tailwater: Agricultural runoff.

Time of Advance: The duration of time required for water to flow from the upper to the lower end of a field.

Time (Duration) of Irrigation: The duration of time water should be sprinkled or trickled onto or cover the surface in order to replace the soil water deficit at a given point.

Transpiration: The water essential process by which water is evaporated from plant tissue and diffuses to the air.

Unaccountable Water: The difference between the quantity of water introduced into the system and the quantity delivered to the eventual consumer; usually expressed as a percentage of delivered water. Many local factors affect this percentage from system to system.

Unit Irrigation Efficiency: The ratio of the volume of water used for crop consumptive use and leaching requirement, to the volume of water delivered for these purposes.

Unit Water Use: the average quantity of water used per person, acre, etc., over a specified period of time.

USBR: United States Bureau of Reclamation

Water Conservation: Planned management to prevent or reduce loss or waste of water. It should result in reduced water demand.

APPENDIX F

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